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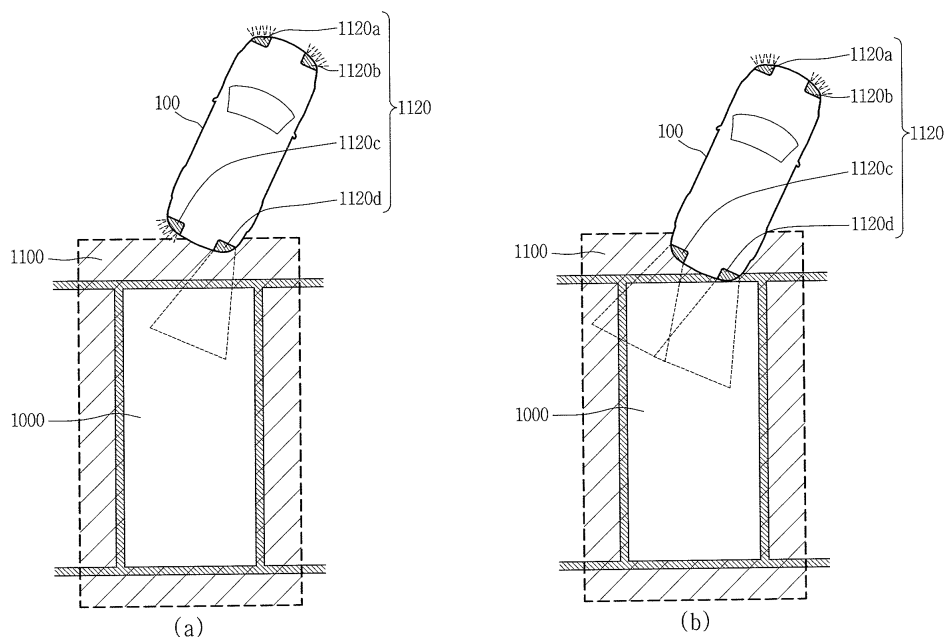
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(54) **VEHICLE CONTROL DEVICE FOR A PLURALITY OF LAMPS MOUNTED ON VEHICLE**

(57) The present invention relates to a vehicle control device (800) provided in a vehicle. A vehicle control device according to one embodiment of the present invention includes a plurality of lamps (810) provided on a vehicle, a sensing unit (860) configured to sense information related to the vehicle, and a processor (870) configured to turn on a lamp in a preset manner, the lamp having entered an area (1100) adjacent to an available parking space of the plurality of lamps, when the sensing unit senses that the vehicle has entered the area adjacent to the available parking space.

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FIG. 11A



Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] This specification relates to a vehicle control device mounted on a vehicle and a method for controlling the vehicle.

2. Background of the Invention

[0002] A vehicle is an apparatus capable of moving a user in the user-desired direction, and a representative example may be a car.

[0003] Meanwhile, for convenience of a user using a vehicle, various types of sensors and electronic devices are provided in the vehicle. Specifically, a study on an Advanced Driver Assistance System (ADAS) is actively undergoing. In addition, an autonomous vehicle is actively under development.

[0004] A vehicle may be provided with various types of lamps. In general, the vehicle includes various vehicle lamps having a lighting function of facilitating articles or objects near the vehicle to be recognized during driving at night, and a signaling function of notifying a driving state of the vehicle to other vehicles or pedestrians.

[0005] For example, the vehicle may include devices operating in a manner of directly emitting light using lamps, such as a head lamp emitting light to a front side to ensure a driver's view, a brake lamp turned on when slamming the brake on, turn indicator lamps used upon a left turn or a right turn.

[0006] As another example, reflectors for reflecting light to facilitate the vehicle to be recognized from outside are mounted on front and rear sides of the vehicle.

[0007] Installation criteria and standards of the lamps for the vehicle are regulated as rules to fully exhibit each function.

[0008] Meanwhile, as the development of the advanced deriving assist system (ADAS) is actively undergoing in recent time, development of a technology for optimizing user's convenience and safety while driving a vehicle is required.

[0009] As one effort, it is needed to develop a technology of optimizing safety in driving a vehicle by controlling lamps.

SUMMARY OF THE INVENTION

[0010] Therefore, an aspect of the detailed description is to provide a control device for a vehicle capable of controlling lamps in an optimized manner upon parking the vehicle, and a method for controlling the vehicle.

[0011] Another aspect of the detailed description is to provide a control device for a vehicle capable of controlling lamps provided on the vehicle to effectively acquire surrounding information related to an available parking

space upon parking the vehicle, and a method for controlling the vehicle.

[0012] The problems to be solved in the present invention may not be limited to the aforementioned, and other problems to be solved by the present invention will be obviously understood by a person skilled in the art based on the following description.

[0013] To achieve these and other advantages and in accordance with the purpose of this specification, as embodied and broadly described herein, there is provided a vehicle control device, including a plurality of lamps provided on a vehicle, a sensing unit configured to sense information related to the vehicle, and a processor configured to turn on a lamp in a preset manner, the lamp having entered an area adjacent to an available parking space of the plurality of lamps, when the sensing unit senses that the vehicle has entered the area adjacent to the available parking space.

[0014] In an embodiment disclosed herein, the plurality of lamps may be provided on different positions of the vehicle, and the processor may turn on the plurality of lamps in the preset manner in the order of entering the area.

[0015] In an embodiment disclosed herein, the processor may keep turning on the plurality of lamps in the preset manner even though the plurality of lamps enter the parking space through the area.

[0016] In an embodiment disclosed herein, the preset manner may be a manner of continuously turning on the plurality of lamps, irrespective of a type of each lamp and a specific lighting method of each lamp.

[0017] In an embodiment disclosed herein, the adjacent area may be an area existing within a predetermined distance from the parking space.

[0018] In an embodiment disclosed herein, the processor may turn on lamps with a predetermined period, wherein the lamps have not entered the area yet of the plurality of lamps.

[0019] In an embodiment disclosed herein, the processor may turn on a different lamp in the preset manner according to a direction that the vehicle enters the parking space.

[0020] In an embodiment disclosed herein, the processor may continuously turn on a lamp provided on a front surface of the vehicle of the plurality of lamps when the vehicle enters the area adjacent to the parking space, starting from the front surface. On the other hand, the processor may continuously turn on a lamp provided on a rear surface of the vehicle of the plurality of lamps when the vehicle enters the area adjacent to the parking space, starting from the rear surface.

[0021] In an embodiment disclosed herein, the processor may continuously turn on a lamp provided on one side surface, closer to the parking space, of a plurality of side surfaces of the vehicle when the vehicle executes parallel parking.

[0022] In an embodiment disclosed herein, the processor may continuously turn on even a lamp, which has

not entered the adjacent area yet, of a plurality of lamps provided on the one side surface, when the vehicle executes the parallel parking.

[0023] In an embodiment disclosed herein, at least one of the plurality of lamps may be configured to vary a light output direction, and the processor may control a light output direction of a lamp, which is turned on in the preset manner, to be directed to a center of the parking space.

[0024] In an embodiment disclosed herein, the processor may sense through the sensing unit whether or not a specific object is present within a predetermined distance from the vehicle, and control the plurality of lamps in different manners according to the sensing result.

[0025] In an embodiment disclosed herein, the processor may turn on all of the plurality of lamps in the preset manner when the specific object is not sensed, and turn on only a lamp entering the area, of the plurality of lamps, in the preset manner when the specific object is sensed.

[0026] In an embodiment disclosed herein, the processor may sense through the sensing unit whether or not a preset object is present within the parking space or adjacent to the parking space. The processor may turn on a lamp entering the area in the preset manner when the present object is present. The processor may not turn on the lamp entering the area in the preset manner when the preset object is not present.

[0027] A vehicle according to one embodiment of the present invention may include the vehicle control device described in this specification.

[0028] A method for controlling a vehicle having a plurality of lamps according to one embodiment of the present invention may include sensing an entry of the vehicle in an area adjacent to an available parking space, and turning on a lamp entering the area of the plurality of lamps in a preset manner.

[0029] In an embodiment disclosed herein, the turning on may be configured to turn on the plurality of lamps in the preset manner in the order of entering the area.

[0030] In an embodiment disclosed herein, the turning on may be configured to keep turning on the plurality of lamps in the preset manner even though the plurality of lamps enter the parking space through the area.

[0031] In an embodiment disclosed herein, the preset manner may be a manner of continuously turning on the plurality of lamps, irrespective of a type of each lamp and a specific lighting method of each lamp.

[0032] In an embodiment disclosed herein, the adjacent area may be an area existing within a predetermined distance from the parking space.

[0033] Details of other embodiments will be disclosed in the detailed description and the accompanying drawings.

[0034] According to an embodiment of the present invention, at least one of the following effects can be acquired.

[0035] First, the present invention may continuously turn on at least part of a plurality of lamps provided on a vehicle to facilitate acquisition of surrounding information

related to an available parking space upon parking the vehicle, thereby remarkably increasing an acquisition rate or recognition rate of the surrounding information regarding the available parking space.

[0036] Second, the present invention can help parking by increasing a recognition rate of a parking space or objects around the vehicle in a manner of continuously turning on at least part of the plurality of lamps upon parking the vehicle, and notify the ongoing parking of the vehicle to people or other vehicles around the vehicle using the other lamps.

[0037] The effects of the present invention may not be limited to those effects, and other effects which have not been mentioned can be obviously understood by those skilled in the art from the appending claims.

[0038] Further scope of applicability of the present application will become more apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from the detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

[0039] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate exemplary embodiments and together with the description serve to explain the principles of the invention.

[0040] In the drawings:

FIG. 1 is a view illustrating appearance of a vehicle in accordance with an embodiment of the present invention;

FIG. 2 is a view illustrating appearance of a vehicle at various angles in accordance with an embodiment of the present invention;

FIGS. 3 and 4 are views illustrating an inside of a vehicle in accordance with an embodiment of the present invention;

FIGS. 5 and 6 are reference views illustrating objects in accordance with an embodiment of the present invention;

FIG. 7 is a block diagram illustrating a vehicle in accordance with an embodiment of the present invention;

FIG. 8 is a conceptual view illustrating a vehicle control device in accordance with an embodiment of the present invention;

FIG. 9 is a flowchart illustrating a representative control method according to the present invention;

FIGS. 10, 11A, 11B and 11C are conceptual views illustrating the control method illustrated in FIG. 9; and

FIGS. 12A, 12B, 13, 14 and 15 are conceptual views illustrating a method of controlling lamps provided on a vehicle in accordance with various embodiments of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0041] Description will now be given in detail according to exemplary embodiments disclosed herein, with reference to the accompanying drawings. For the sake of brief description with reference to the drawings, the same or equivalent components may be provided with the same or similar reference numbers, and description thereof will not be repeated. In general, a suffix such as "module" and "unit" may be used to refer to elements or components. Use of such a suffix herein is merely intended to facilitate description of the specification, and the suffix itself is not intended to give any special meaning or function. In the present disclosure, that which is well-known to one of ordinary skill in the relevant art has generally been omitted for the sake of brevity. The accompanying drawings are used to help easily understand various technical features and it should be understood that the embodiments presented herein are not limited by the accompanying drawings. As such, the present disclosure should be construed to extend to any alterations, equivalents and substitutes in addition to those which are particularly set out in the accompanying drawings.

[0042] It will be understood that although the terms first, second, etc. may be used herein to describe various elements, these elements should not be limited by these terms. These terms are generally only used to distinguish one element from another.

[0043] It will be understood that when an element is referred to as being "connected with" another element, the element can be connected with the other element or intervening elements may also be present. In contrast, when an element is referred to as being "directly connected with" another element, there are no intervening elements present.

[0044] A singular representation may include a plural representation unless it represents a definitely different meaning from the context.

[0045] Terms such as "include" or "has" are used herein and should be understood that they are intended to indicate an existence of several components, functions or steps, disclosed in the specification, and it is also understood that greater or fewer components, functions, or steps may likewise be utilized.

[0046] A vehicle according to an embodiment of the present invention may be understood as a conception including cars, motorcycles and the like. Hereinafter, the vehicle will be described based on a car.

[0047] The vehicle according to the embodiment of the present invention may be a conception including all of an internal combustion engine car having an engine as a power source, a hybrid vehicle having an engine and an electric motor as power sources, an electric vehicle hav-

ing an electric motor as a power source, and the like.

[0048] In the following description, a left side of a vehicle refers to a left side in a driving direction of the vehicle, and a right side of the vehicle refers to a right side in the driving direction.

[0049] FIG. 1 is a view illustrating appearance of a vehicle in accordance with an embodiment of the present invention.

[0050] FIG. 2 is a view illustrating appearance of a vehicle at various angles in accordance with an embodiment of the present invention.

[0051] FIGS. 3 and 4 are views illustrating an inside of a vehicle in accordance with an embodiment of the present invention.

[0052] FIGS. 5 and 6 are reference views illustrating objects in accordance with an embodiment of the present invention.

[0053] FIG. 7 is a block diagram illustrating a vehicle in accordance with an embodiment of the present invention.

[0054] As illustrated in FIG. 1 to 7, a vehicle 100 may include wheels turning by a driving force, and a steering apparatus 510 for adjusting a driving (ongoing, moving) direction of the vehicle 100.

[0055] The vehicle 100 may be an autonomous vehicle.

[0056] The vehicle 100 may be switched into an autonomous mode or a manual mode based on a user input.

[0057] For example, the vehicle may be converted from the manual mode into the autonomous mode or from the autonomous mode into the manual mode based on a user input received through a user interface apparatus 200.

[0058] The vehicle 100 may be switched into the autonomous mode or the manual mode based on driving environment information. The driving environment information may be generated based on object information provided from an object detecting apparatus 300.

[0059] For example, the vehicle 100 may be switched from the manual mode into the autonomous mode or from the autonomous module into the manual mode based on driving environment information generated in the object detecting apparatus 300.

[0060] In an example, the vehicle 100 may be switched from the manual mode into the autonomous mode or from the autonomous module into the manual mode based on driving environment information received through a communication apparatus 400.

[0061] The vehicle 100 may be switched from the manual mode into the autonomous mode or from the autonomous module into the manual mode based on information, data or signal provided from an external device.

[0062] When the vehicle 100 is driven in the autonomous mode, the autonomous vehicle 100 may be driven based on an operation system 700.

[0063] For example, the autonomous vehicle 100 may be driven based on information, data or signal generated in a driving system 710, a parking exit system 740 and

a parking system 750.

[0064] When the vehicle 100 is driven in the manual mode, the autonomous vehicle 100 may receive a user input for driving through a driving control apparatus 500. The vehicle 100 may be driven based on the user input received through the driving control apparatus 500.

[0065] An overall length refers to a length from a front end to a rear end of the vehicle 100, a width refers to a width of the vehicle 100, and a height refers to a length from a bottom of a wheel to a roof. In the following description, an overall-length direction L may refer to a direction which is a criterion for measuring the overall length of the vehicle 100, a width direction W may refer to a direction that is a criterion for measuring a width of the vehicle 100, and a height direction H may refer to a direction that is a criterion for measuring a height of the vehicle 100.

[0066] As illustrated in FIG. 7, the vehicle 100 may include a user interface apparatus 200, an object detecting apparatus 300, a communication apparatus 400, a driving control apparatus 500, a vehicle operating apparatus 600, a operation system 700, a navigation system 770, a sensing unit 120, an interface unit 130, a memory 140, a controller 170 and a power supply unit 190.

[0067] According to embodiments, the vehicle 100 may include more components in addition to components to be explained in this specification or may not include some of those components to be explained in this specification.

[0068] The user interface apparatus 200 is an apparatus for communication between the vehicle 100 and a user. The user interface apparatus 200 may receive a user input and provide information generated in the vehicle 100 to the user. The vehicle 200 may implement user interfaces (UIs) or user experiences (UXs) through the user interface apparatus 200.

[0069] The user interface apparatus 200 may include an input unit 210, an internal camera 220, a biometric sensing unit 230, an output unit 250 and a processor 270.

[0070] According to embodiments, the user interface apparatus 200 may include more components in addition to components to be explained in this specification or may not include some of those components to be explained in this specification.

[0071] The input unit 200 may allow the user to input information. Data collected in the input unit 120 may be analyzed by the processor 270 and processed as a user's control command.

[0072] The input unit 210 may be disposed within the vehicle. For example, the input unit 200 may be disposed on one area of a steering wheel, one area of an instrument panel, one area of a seat, one area of each pillar, one area of a door, one area of a center console, one area of a headlining, one area of a sun visor, one area of a wind shield, one area of a window or the like.

[0073] The input unit 210 may include a voice input module 211, a gesture input module 212, a touch input module 213, and a mechanical input module 214.

[0074] The audio input module 211 may convert a user's voice input into an electric signal. The converted electric signal may be provided to the processor 270 or the controller 170.

5 **[0075]** The voice input module 211 may include at least one microphone.

[0076] The gesture input module 212 may convert a user's gesture input into an electric signal. The converted electric signal may be provided to the processor 270 or the controller 170.

10 **[0077]** The gesture input module 212 may include at least one of an infrared sensor and an image sensor for detecting the user's gesture input.

[0078] According to embodiments, the gesture input module 212 may detect a user's three-dimensional (3D) gesture input. To this end, the gesture input module 212 may include a light emitting diode outputting a plurality of infrared rays or a plurality of image sensors.

15 **[0079]** The gesture input module 212 may detect the user's 3D gesture input by a time of flight (TOF) method, a structured light method or a disparity method.

[0080] The touch input module 213 may convert the user's touch input into an electric signal. The converted electric signal may be provided to the processor 270 or the controller 170.

20 **[0081]** The touch input module 213 may include a touch sensor for detecting the user's touch input.

[0082] According to an embodiment, the touch input module 213 may be integrated with the display unit 251 so as to implement a touch screen. The touch screen may provide an input interface and an output interface between the vehicle 100 and the user.

30 **[0083]** The mechanical input module 214 may include at least one of a button, a dome switch, a jog wheel and a jog switch. An electric signal generated by the mechanical input module 214 may be provided to the processor 270 or the controller 170.

35 **[0084]** The mechanical input module 214 may be arranged on a steering wheel, a center fascia, a center console, a cockpit module, a door and the like.

[0085] The internal camera 220 may acquire an internal image of the vehicle. The processor 270 may detect a user's state based on the internal image of the vehicle. The processor 270 may acquire information related to the user's gaze from the internal image of the vehicle. The processor 270 may detect a user gesture from the internal image of the vehicle.

40 **[0086]** The biometric sensing unit 230 may acquire the user's biometric information. The biometric sensing module 230 may include a sensor for detecting the user's biometric information and acquire fingerprint information and heart rate information regarding the user using the sensor. The biometric information may be used for user authentication.

45 **[0087]** The output unit 250 may generate an output related to a visual, audible or tactile signal.

[0088] The output unit 250 may include at least one of a display module 251, an audio output module 252 and

a haptic output module 253.

[0089] The display module 251 may output graphic objects corresponding to various types of information.

[0090] The display module 251 may include at least one of a liquid crystal display (LCD), a thin film transistor-LCD (TFT LCD), an organic light-emitting diode (OLED), a flexible display, a three-dimensional (3D) display and an e-ink display.

[0091] The display module 251 may be inter-layered or integrated with a touch input module 213 to implement a touch screen.

[0092] The display module 251 may be implemented as a head up display (HUD). When the display module 251 is implemented as the HUD, the display module 251 may be provided with a projecting module so as to output information through an image which is projected on a windshield or a window.

[0093] The display module 251 may include a transparent display. The transparent display may be attached to the windshield or the window.

[0094] The transparent display may have a predetermined degree of transparency and output a predetermined screen thereon. The transparent display may include at least one of a thin film electroluminescent (TFEL), a transparent OLED, a transparent LCD, a transmissive transparent display and a transparent LED display. The transparent display may have adjustable transparency.

[0095] Meanwhile, the user interface apparatus 200 may include a plurality of display modules 251a to 251g.

[0096] The display module 251 may be disposed on one area of a steering wheel, one area 251a, 251b, 251e of an instrument panel, one area 251d of a seat, one area 251f of each pillar, one area 251g of a door, one area of a center console, one area of a headlining or one area of a sun visor, or implemented on one area 251c of a windshield or one area 251h of a window.

[0097] The audio output module 252 converts an electric signal provided from the processor 270 or the controller 170 into an audio signal for output. To this end, the audio output module 252 may include at least one speaker.

[0098] The haptic output module 253 generates a tactile output. For example, the haptic output module 253 may vibrate the steering wheel, a safety belt, a seat 110FL, 110FR, 110RL, 110RR such that the user can recognize such output.

[0099] The processor 270 may control an overall operation of each unit of the user interface apparatus 200.

[0100] According to an embodiment, the user interface apparatus 200 may include a plurality of processors 270 or may not include any processor 270.

[0101] When the processor 270 is not included in the user interface apparatus 200, the user interface apparatus 200 may operate according to a control of a processor of another apparatus within the vehicle 100 or the controller 170.

[0102] Meanwhile, the user interface apparatus 200

may be called as a display apparatus for vehicle.

[0103] The user interface apparatus 200 may operate according to the control of the controller 170.

[0104] The object detecting apparatus 300 is an apparatus for detecting an object located at outside of the vehicle 100.

[0105] The object may be a variety of objects associated with driving (operation) of the vehicle 100.

[0106] Referring to FIGS. 5 and 6, an object O may include a traffic lane OB10, another vehicle OB11, a pedestrian OB12, a two-wheeled vehicle OB13, traffic signals OB14 and OB15, light, a road, a structure, a speed hump, a geographical feature, an animal and the like.

[0107] The lane OB01 may be a driving lane, a lane next to the driving lane or a lane on which another vehicle comes in an opposite direction to the vehicle 100. The lanes OB10 may be a concept including left and right lines forming a lane.

[0108] The another vehicle OB11 may be a vehicle which is moving around the vehicle 100. The another vehicle OB11 may be a vehicle located within a predetermined distance from the vehicle 100. For example, the another vehicle OB11 may be a vehicle which moves before or after the vehicle 100.

[0109] The pedestrian OB12 may be a person located near the vehicle 100. The pedestrian OB12 may be a person located within a predetermined distance from the vehicle 100. For example, the pedestrian OB12 may be a person located on a sidewalk or roadway.

[0110] The two-wheeled vehicle OB13 may refer to a vehicle (transportation facility) that is located near the vehicle 100 and moves using two wheels. The two-wheeled vehicle OB13 may be a vehicle that is located within a predetermined distance from the vehicle 100 and has two wheels. For example, the two-wheeled vehicle OB13 may be a motorcycle or a bicycle that is located on a sidewalk or roadway.

[0111] The traffic signals may include a traffic light OB15, a traffic sign OB14 and a pattern or text drawn on a road surface.

[0112] The light may be light emitted from a lamp provided on another vehicle. The light may be light generated from a streetlamp. The light may be solar light.

[0113] The road may include a road surface, a curve, an upward slope, a downward slope and the like.

[0114] The structure may be an object that is located near a road and fixed on the ground. For example, the structure may include a streetlamp, a roadside tree, a building, an electric pole, a traffic light, a bridge and the like.

[0115] The geographical feature may include a mountain, a hill and the like.

[0116] Meanwhile, objects may be classified into a moving object and a fixed object. For example, the moving object may be a concept including another vehicle and a pedestrian. The fixed object may be a concept including a traffic signal, a road and a structure.

[0117] The object detecting apparatus 300 may in-

clude a camera 310, a radar 320, a LiDAR 330, an ultrasonic sensor 340, an infrared sensor 350 and a processor 370.

[0118] According to an embodiment, the object detecting apparatus 300 may further include other components in addition to the components described, or may not include some of the components described.

[0119] The camera 310 may be located on an appropriate portion outside the vehicle to acquire an external image of the vehicle. The camera 310 may be a mono camera, a stereo camera 310a, an around view monitoring (AVM) camera 310b or a 360-degree camera.

[0120] For example, the camera 310 may be disposed adjacent to a front windshield within the vehicle to acquire a front image of the vehicle. Or, the camera 310 may be disposed adjacent to a front bumper or a radiator grill.

[0121] For example, the camera 310 may be disposed adjacent to a rear glass within the vehicle to acquire a rear image of the vehicle. Or, the camera 310 may be disposed adjacent to a rear bumper, a trunk or a tail gate.

[0122] For example, the camera 310 may be disposed adjacent to at least one of side windows within the vehicle to acquire a side image of the vehicle. Or, the camera 310 may be disposed adjacent to a side mirror, a fender or a door.

[0123] The camera 310 may provide an acquired image to the processor 370.

[0124] The radar 320 may include electric wave transmitting and receiving portions. The radar 320 may be implemented as a pulse radar or a continuous wave radar according to a principle of emitting electric waves. The radar 320 may be implemented in a frequency modulated continuous wave (FMCW) manner or a frequency shift Keying (FSK) manner according to a signal waveform, among the continuous wave radar methods.

[0125] The radar 320 may detect an object in a time of flight (TOF) manner or a phase-shift manner through the medium of the electric wave, and detect a position of the detected object, a distance from the detected object and a relative speed with the detected object.

[0126] The radar 320 may be disposed on an appropriate position outside the vehicle for detecting an object which is located at a front, rear or side of the vehicle.

[0127] The LiDAR 330 may include laser transmitting and receiving portions. The LiDAR 330 may be implemented in a time of flight (TOF) manner or a phase-shift manner.

[0128] The LiDAR 330 may be implemented as a drive type or a non-drive type.

[0129] For the drive type, the LiDAR 330 may be rotated by a motor and detect object near the vehicle 100.

[0130] For the non-drive type, the LiDAR 330 may detect, through light steering, objects which are located within a predetermined range based on the vehicle 100. The vehicle 100 may include a plurality of non-drive type LiDARs 330.

[0131] The LiDAR 330 may detect an object in a TOP manner or a phase-shift manner through the medium of

a laser beam, and detect a position of the detected object, a distance from the detected object and a relative speed with the detected object.

[0132] The LiDAR 330 may be disposed on an appropriate position outside the vehicle for detecting an object located at the front, rear or side of the vehicle.

[0133] The ultrasonic sensor 340 may include ultrasonic wave transmitting and receiving portions. The ultrasonic sensor 340 may detect an object based on an ultrasonic wave, and detect a position of the detected object, a distance from the detected object and a relative speed with the detected object.

[0134] The ultrasonic sensor 340 may be disposed on an appropriate position outside the vehicle for detecting an object located at the front, rear or side of the vehicle.

[0135] The infrared sensor 350 may include infrared light transmitting and receiving portions. The infrared sensor 340 may detect an object based on infrared light, and detect a position of the detected object, a distance from the detected object and a relative speed with the detected object.

[0136] The infrared sensor 350 may be disposed on an appropriate position outside the vehicle for detecting an object located at the front, rear or side of the vehicle.

[0137] The processor 370 may control an overall operation of each unit of the object detecting apparatus 300.

[0138] The processor 370 may detect an object based on an acquired image, and track the object. The processor 370 may execute operations, such as a calculation of a distance from the object, a calculation of a relative speed with the object and the like, through an image processing algorithm.

[0139] The processor 370 may detect an object based on a reflected electromagnetic wave which an emitted electromagnetic wave is reflected from the object, and track the object. The processor 370 may execute operations, such as a calculation of a distance from the object, a calculation of a relative speed with the object and the like, based on the electromagnetic wave.

[0140] The processor 370 may detect an object based on a reflected laser beam which an emitted laser beam is reflected from the object, and track the object. The processor 370 may execute operations, such as a calculation of a distance from the object, a calculation of a relative speed with the object and the like, based on the laser beam.

[0141] The processor 370 may detect an object based on a reflected ultrasonic wave which an emitted ultrasonic wave is reflected from the object, and track the object.

The processor 370 may execute operations, such as a calculation of a distance from the object, a calculation of a relative speed with the object and the like, based on the ultrasonic wave.

[0142] The processor may detect an object based on reflected infrared light which emitted infrared light is reflected from the object, and track the object. The processor 370 may execute operations, such as a calculation of a distance from the object, a calculation of a relative

speed with the object and the like, based on the infrared light.

[0143] According to an embodiment, the object detecting apparatus 300 may include a plurality of processors 370 or may not include any processor 370. For example,

[0144] When the processor 370 is not included in the object detecting apparatus 300, the object detecting apparatus 300 may operate according to the control of a processor of an apparatus within the vehicle 100 or the controller 170.

[0145] The object detecting apparatus 300 may operate according to the control of the controller 170.

[0146] The communication apparatus 400 is an apparatus for performing communication with an external device. Here, the external device may be another vehicle, a mobile terminal or a server.

[0147] The communication apparatus 400 may perform the communication by including at least one of a transmitting antenna, a receiving antenna, and radio frequency (RF) circuit and RF device for implementing various communication protocols.

[0148] The communication apparatus 400 may include a short-range communication unit 410, a location information unit 420, a V2X communication unit 430, an optical communication unit 440, a broadcast transceiver 450 and a processor 470.

[0149] According to an embodiment, the communication apparatus 400 may further include other components in addition to the components described, or may not include some of the components described.

[0150] The short-range communication unit 410 is a unit for facilitating short-range communications. Suitable technologies for implementing such short-range communications include BLUETOOTH™, Radio Frequency Identification (RFID), Infrared Data Association (IrDA), Ultra-WideBand (UWB), ZigBee, Near Field Communication (NFC), Wireless-Fidelity (Wi-Fi), Wi-Fi Direct, Wireless USB (Wireless Universal Serial Bus), and the like.

[0151] The short-range communication unit 410 may construct short-range area networks to perform short-range communication between the vehicle 100 and at least one external device.

[0152] The location information unit 420 is a unit for acquiring position information. For example, the location information unit 420 may include a Global Positioning System (GPS) module or a Differential Global Positioning System (DGPS) module.

[0153] The V2X communication unit 430 is a unit for performing wireless communications with a server (Vehicle to Infra; V2I), another vehicle (Vehicle to Vehicle; V2V), or a pedestrian (Vehicle to Pedestrian; V2P). The V2X communication unit 430 may include an RF circuit implementing a communication protocol with the infra (V2I), a communication protocol between the vehicles

(V2V) and a communication protocol with a pedestrian (V2P).

[0154] The optical communication unit 440 is a unit for performing communication with an external device through the medium of light. The optical communication unit 440 may include a light-emitting diode for converting an electric signal into an optical signal and sending the optical signal to the exterior, and a photodiode for converting the received optical signal into an electric signal.

[0155] According to an embodiment, the light-emitting diode may be integrated with lamps provided on the vehicle 100.

[0156] The broadcast transceiver 450 is a unit for receiving a broadcast signal from an external broadcast managing entity or transmitting a broadcast signal to the broadcast managing entity via a broadcast channel. The broadcast channel may include a satellite channel, a terrestrial channel, or both. The broadcast signal may include a TV broadcast signal, a radio broadcast signal and a data broadcast signal.

[0157] The processor 470 may control an overall operation of each unit of the communication apparatus 400.

[0158] According to an embodiment, the communication apparatus 400 may include a plurality of processors 470 or may not include any processor 470.

[0159] When the processor 470 is not included in the communication apparatus 400, the communication apparatus 400 may operate according to the control of a processor of another device within the vehicle 100 or the controller 170.

[0160] Meanwhile, the communication apparatus 400 may implement a display apparatus for a vehicle together with the user interface apparatus 200. In this instance, the display apparatus for the vehicle may be referred to as a telematics apparatus or an Audio Video Navigation (AVN) apparatus.

[0161] The communication apparatus 400 may operate according to the control of the controller 170.

[0162] The driving control apparatus 500 is an apparatus for receiving a user input for driving.

[0163] In a manual mode, the vehicle 100 may be operated based on a signal provided by the driving control apparatus 500.

[0164] The driving control apparatus 500 may include a steering input device 510, an acceleration input device 530 and a brake input device 570.

[0165] The steering input device 510 may receive an input regarding a driving (ongoing) direction of the vehicle 100 from the user. The steering input device 510 is preferably configured in the form of a wheel allowing a steering input in a rotating manner. According to some embodiments, the steering input device may also be configured in a shape of a touch screen, a touchpad or a button.

[0166] The acceleration input device 530 may receive an input for accelerating the vehicle 100 from the user. The brake input device 570 may receive an input for braking the vehicle 100 from the user. Each of the acceleration input device 530 and the brake input device 570 is pref-

erably configured in the form of a pedal. According to some embodiments, the acceleration input device or the brake input device may also be configured in a shape of a touch screen, a touchpad or a button.

[0167] The driving control apparatus 500 may operate according to the control of the controller 170.

[0168] The vehicle operating apparatus 600 is an apparatus for electrically controlling operations of various devices within the vehicle 100.

[0169] The vehicle operating apparatus 600 may include a power train operating unit 610, a chassis operating unit 620, a door/window operating unit 630, a safety apparatus operating unit 640, a lamp operating unit 650, and an air-conditioner operating unit 660.

[0170] According to some embodiments, the vehicle operating apparatus 600 may further include other components in addition to the components described, or may not include some of the components described.

[0171] Meanwhile, the vehicle operating apparatus 600 may include a processor. Each unit of the vehicle operating apparatus 600 may individually include a processor.

[0172] The power train operating unit 610 may control an operation of a power train device.

[0173] The power train operating unit 610 may include a power source operating portion 611 and a gearbox operating portion 612.

[0174] The power source operating portion 611 may perform a control for a power source of the vehicle 100.

[0175] For example, upon using a fossil fuel-based engine as the power source, the power source operating portion 611 may perform an electronic control for the engine. Accordingly, an output torque and the like of the engine can be controlled. The power source operating portion 611 may adjust the engine output torque according to the control of the controller 170.

[0176] For example, upon using an electric energy-based motor as the power source, the power source operating portion 611 may perform a control for the motor. The power source operating portion 611 may adjust a rotating speed, a torque and the like of the motor according to the control of the controller 170.

[0177] The gearbox operating portion 612 may perform a control for a gearbox.

[0178] The gearbox operating portion 612 may adjust a state of the gearbox. The gearbox operating portion 612 may change the state of the gearbox into drive (forward) (D), reverse (R), neutral (N) or parking (P).

[0179] Meanwhile, when an engine is the power source, the gearbox operating portion 612 may adjust a locked state of a gear in the drive (D) state.

[0180] The chassis operating unit 620 may control an operation of a chassis device.

[0181] The chassis operating unit 620 may include a steering operating portion 621, a brake operating portion 622 and a suspension operating portion 623.

[0182] The steering operating portion 621 may perform an electronic control for a steering apparatus within the

vehicle 100. The steering operating portion 621 may change a driving direction of the vehicle.

[0183] The brake operating portion 622 may perform an electronic control for a brake apparatus within the vehicle 100. For example, the brake operating portion 622 may control an operation of brakes provided at wheels to reduce speed of the vehicle 100.

[0184] Meanwhile, the brake operating portion 622 may individually control each of a plurality of brakes. The brake operating portion 622 may differently control braking force applied to each of a plurality of wheels.

[0185] The suspension operating portion 623 may perform an electronic control for a suspension apparatus within the vehicle 100. For example, the suspension operating portion 623 may control the suspension apparatus to reduce vibration of the vehicle 100 when a bump is present on a road.

[0186] Meanwhile, the suspension operating portion 623 may individually control each of a plurality of suspensions.

[0187] The door/window operating unit 630 may perform an electronic control for a door apparatus or a window apparatus within the vehicle 100.

[0188] The door/window operating unit 630 may include a door operating portion 631 and a window operating portion 632.

[0189] The door operating portion 631 may perform the control for the door apparatus. The door operating portion 631 may control opening or closing of a plurality of doors of the vehicle 100. The door operating portion 631 may control opening or closing of a trunk or a tail gate. The door operating portion 631 may control opening or closing of a sunroof.

[0190] The window operating portion 632 may perform the electronic control for the window apparatus. The window operating portion 632 may control opening or closing of a plurality of windows of the vehicle 100.

[0191] The safety apparatus operating unit 640 may perform an electronic control for various safety apparatuses within the vehicle 100.

[0192] The safety apparatus operating unit 640 may include an airbag operating portion 641, a seatbelt operating portion 642 and a pedestrian protecting apparatus operating portion 643.

[0193] The airbag operating portion 641 may perform an electronic control for an airbag apparatus within the vehicle 100. For example, the airbag operating portion 641 may control the airbag to be deployed upon a detection of a risk.

[0194] The seatbelt operating portion 642 may perform an electronic control for a seatbelt apparatus within the vehicle 100. For example, the seatbelt operating portion 642 may control passengers to be motionlessly seated in seats 110FL, 110FR, 110RL, 110RR using seatbelts upon a detection of a risk.

[0195] The pedestrian protecting apparatus operating portion 643 may perform an electronic control for a hood lift and a pedestrian airbag. For example, the pedestrian

protecting apparatus operating portion 643 may control the hood lift and the pedestrian airbag to be open up upon detecting pedestrian collision.

[0196] The lamp operating unit 650 may perform an electronic control for various lamp apparatuses within the vehicle 100.

[0197] The air-conditioner operating unit 660 may perform an electronic control for an air conditioner within the vehicle 100. For example, the air-conditioner operating unit 660 may control the air conditioner to supply cold air into the vehicle when internal temperature of the vehicle is high.

[0198] The vehicle operating apparatus 600 may include a processor. Each unit of the vehicle operating apparatus 600 may individually include a processor.

[0199] The vehicle operating apparatus 600 may operate according to the control of the controller 170.

[0200] The operation system 700 is a system that controls various driving modes of the vehicle 100. The operation system 700 may include a driving system 710, a parking exit system 740 and a parking system 750.

[0201] According to embodiments, the operation system 700 may further include other components in addition to components to be described, or may not include some of the components to be described.

[0202] Meanwhile, the operation system 700 may include a processor. Each unit of the operation system 700 may individually include a processor.

[0203] According to embodiments, the operation system may be a sub concept of the controller 170 when it is implemented in a software configuration.

[0204] Meanwhile, according to embodiment, the operation system 700 may be a concept including at least one of the user interface apparatus 200, the object detecting apparatus 300, the communication apparatus 400, the vehicle operating apparatus 600 and the controller 170.

[0205] The driving system 710 may perform driving of the vehicle 100.

[0206] The driving system 710 may receive navigation information from a navigation system 770, transmit a control signal to the vehicle operating apparatus 600, and perform driving of the vehicle 100.

[0207] The driving system 710 may receive object information from the object detecting apparatus 300, transmit a control signal to the vehicle operating apparatus 600 and perform driving of the vehicle 100.

[0208] The driving system 710 may receive a signal from an external device through the communication apparatus 400, transmit a control signal to the vehicle operating apparatus 600, and perform driving of the vehicle 100.

[0209] The parking exit system 740 may perform an exit of the vehicle 100 from a parking lot.

[0210] The parking exit system 740 may receive navigation information from the navigation system 770, transmit a control signal to the vehicle operating apparatus 600, and perform the exit of the vehicle 100 from

the parking lot.

[0211] The parking exit system 740 may receive object information from the object detecting apparatus 300, transmit a control signal to the vehicle operating apparatus 600 and perform the exit of the vehicle 100 from the parking lot.

[0212] The parking exit system 740 may receive a signal from an external device through the communication apparatus 400, transmit a control signal to the vehicle operating apparatus 600, and perform the exit of the vehicle 100 from the parking lot.

[0213] The parking system 750 may perform parking of the vehicle 100.

[0214] The parking system 750 may receive navigation information from the navigation system 770, transmit a control signal to the vehicle operating apparatus 600, and park the vehicle 100.

[0215] The parking system 750 may receive object information from the object detecting apparatus 300, transmit a control signal to the vehicle operating apparatus 600 and park the vehicle 100.

[0216] The parking system 750 may receive a signal from an external device through the communication apparatus 400, transmit a control signal to the vehicle operating apparatus 600, and park the vehicle 100.

[0217] The navigation system 770 may provide navigation information. The navigation information may include at least one of map information, information regarding a set destination, path information according to the set destination, information regarding various objects on a path, lane information and current location information of the vehicle.

[0218] The navigation system 770 may include a memory and a processor. The memory may store the navigation information. The processor may control an operation of the navigation system 770.

[0219] According to embodiments, the navigation system 770 may update prestored information by receiving information from an external device through the communication apparatus 400.

[0220] According to embodiments, the navigation system 770 may be classified as a sub component of the user interface apparatus 200.

[0221] The sensing unit 120 may sense a status of the vehicle. The sensing unit 120 may include a posture sensor (e.g., a yaw sensor, a roll sensor, a pitch sensor, etc.), a collision sensor, a wheel sensor, a speed sensor, a tilt sensor, a weight-detecting sensor, a heading sensor, a gyro sensor, a position module, a vehicle forward/backward movement sensor, a battery sensor, a fuel sensor, a tire sensor, a steering sensor by a turn of a handle, a vehicle internal temperature sensor, a vehicle internal humidity sensor, an ultrasonic sensor, an illumination sensor, an accelerator position sensor, a brake pedal position sensor, and the like.

[0222] The sensing unit 120 may acquire sensing signals with respect to vehicle-related information, such as a posture, a collision, an orientation, a position (GPS in-

formation), an angle, a speed, an acceleration, a tilt, a forward/backward movement, a battery, a fuel, tires, lamps, internal temperature, internal humidity, a rotated angle of a steering wheel, external illumination, pressure applied to an accelerator, pressure applied to a brake pedal and the like.

[0223] The sensing unit 120 may further include an accelerator sensor, a pressure sensor, an engine speed sensor, an air flow sensor (AFS), an air temperature sensor (ATS), a water temperature sensor (WTS), a throttle position sensor (TPS), a TDC sensor, a crank angle sensor (CAS), and the like.

[0224] The interface unit 130 may serve as a path allowing the vehicle 100 to interface with various types of external devices connected thereto. For example, the interface unit 130 may be provided with a port connectable with a mobile terminal, and connected to the mobile terminal through the port. In this instance, the interface unit 130 may exchange data with the mobile terminal.

[0225] Meanwhile, the interface unit 130 may serve as a path for supplying electric energy to the connected mobile terminal. When the mobile terminal is electrically connected to the interface unit 130, the interface unit 130 supplies electric energy supplied from a power supply unit 190 to the mobile terminal according to the control of the controller 170.

[0226] The memory 140 is electrically connected to the controller 170. The memory 140 may store basic data for units, control data for controlling operations of units and input/output data. The memory 140 may be a variety of storage devices, such as ROM, RAM, EPROM, a flash drive, a hard drive and the like in a hardware configuration. The memory 140 may store various data for overall operations of the vehicle 100, such as programs for processing or controlling the controller 170.

[0227] According to embodiments, the memory 140 may be integrated with the controller 170 or implemented as a sub component of the controller 170.

[0228] The controller 170 may control an overall operation of each unit of the vehicle 100. The controller 170 may be referred to as an Electronic Control Unit (ECU).

[0229] The power supply unit 190 may supply power required for an operation of each component according to the control of the controller 170. Specifically, the power supply unit 190 may receive power supplied from an internal battery of the vehicle, and the like.

[0230] At least one processor and the controller 170 included in the vehicle 100 may be implemented using at least one of application specific integrated circuits (ASICs), digital signal processors (DSPs), digital signal processing devices (DSPDs), programmable logic devices (PLDs), field programmable gate arrays (FPGAs), processors, controllers, micro controllers, microprocessors, and electric units performing other functions.

[0231] Meanwhile, the vehicle 100 according to the present invention may include a vehicle control device 800.

[0232] The vehicle control device 800 may control at

least one of those components illustrated in FIG. 7. From this perspective, the vehicle control device 800 may be the controller 170.

[0233] Without a limit to this, the vehicle control device 800 may be a separate device, independent of the controller 170. When the vehicle control device 800 is implemented as a component independent of the controller 170, the vehicle control device 800 may be provided on a part of the vehicle 100.

[0234] Hereinafter, description will be given of an example that the vehicle control device 800 is a component separate from the controller 170 for the sake of explanation. In this specification, functions (operations) and control methods described in relation to the vehicle control device 800 may be executed by the controller 170 of the vehicle. That is, every detail described in relation to the vehicle control device 800 may be applied to the controller 170 in the same/like manner.

[0235] Also, the vehicle control device 800 described herein may include some of the components illustrated in FIG. 7 and various components included in the vehicle. For the sake of explanation, the components illustrated in FIG. 7 and the various components included in the vehicle will be described with separate names and reference numbers.

[0236] Hereinafter, description will be given in more detail of components included in the vehicle control device 800 in accordance with one embodiment of the present invention, with reference to the accompanying drawings.

[0237] FIG. 8 is a conceptual view illustrating a vehicle control device in accordance with an embodiment of the present invention.

[0238] The vehicle control device 800 according to the present invention may include a plurality of lamps 810. The plurality of lamps 810 may be provided on the vehicle 100.

[0239] The plurality of lamps 810 may be lamps for vehicle provided on the vehicle, and include head lamps 1120a and 1120b (see FIG. 10) provided on the front of the vehicle to emit visible light to the front of the vehicle, rear lamps 1120c and 1120d (see FIG. 10) provided on the rear of the vehicle to emit (output) visible light to the rear of the vehicle, and a turn indicator lamp (not illustrated) provided on at least one of the head lamps, the rear lamps, side surfaces of the vehicle and side mirrors.

[0240] Also, at least one of the front surface of the vehicle and the head lamps may further be provided with a fog lamp, a tail lamp, a cornering lamp configured such that a light emitting (or output) direction thereof is varied in response to a manipulation of a steering apparatus, and the like.

[0241] Also, at least one of the rear surface of the vehicle and the rear lamps may further be provided with a reversing light which is lighted on when a reverse gear is set.

[0242] The rear lamps may include brake lamps (or braking lamps) that emit light to the rear of the vehicle,

in response to the brake apparatus being driven (or a brake pedal being depressed).

[0243] The turn indicator lamp may also serve as an emergency lamp.

[0244] The plurality of lamps described herein may include all of the various types of lamps. Hereinafter, for the sake of explanation, examples for the head lamps and the rear lamps will be described in relation to the present invention.

[0245] The head lamps may be turned on when a user request is received through the lamp operating unit 650, the mechanical input unit 214 or the driving control apparatus 500. When the head lamps are turned on, the head lamps may output light to the front of the vehicle 100.

[0246] As one example, the head lamps may output low beams to the front of the vehicle 100 when a low beam output request is received by a user request. The low beam may form a preset cut-off line, which may have various shapes according to designs.

[0247] Also, the head lamps may output high beams to the front of the vehicle 100 when a high beam output request is received by a user request. When the high beam output is requested, in general, low beams and high beams may be output simultaneously. An output area of the high beam and an output area of the low beam may partially overlap each other.

[0248] Meanwhile, the low beam or high beam may be output to the front of the vehicle according to the control of the vehicle control device 800. For example, when a light output request is received through the lamp operating unit 650, the mechanical input unit 214 or the driving control apparatus 500, the processor 870 of the vehicle control device 800 may control the head lamps to output light to the front of the vehicle.

[0249] Also, the head lamps may be turned on when it is detected by the sensing unit 120 or 860 that ambient brightness is lower than reference brightness (preset brightness). For example, the processor 870 may control the head lamps to output light to the front of the vehicle when ambient brightness of the vehicle detected by the sensing unit 120 or 860 is lower than the preset brightness.

[0250] Meanwhile, the head lamp, the rear lamps or both may be configured to vary a light output direction.

[0251] For example, the head lamps may vary the light output direction according to the control of the processor 870 of the vehicle control device 800.

[0252] For example, the processor 870 may control the head lamps to output light in an upward direction (e.g., a height direction H) based on a preset condition (e.g., a user's manipulation or surrounding environments) while outputting light in an overall-length direction L.

[0253] The foregoing example has illustrated that the head lamps can vary the light output direction to the upward direction, but the present invention may not be limited to this. The head lamps, the rear lamps or both can be configured to change the light output direction into any direction.

[0254] The light output direction of the head lamps (or rear lamps) may be varied (changed) by at least one of various components (e.g., a light source, a reflector, a shield, a forming body or a lens) constructing each head lamp (or rear lamp), or by a deformation member provided on a housing of the head lamp (or rear lamp) or on an outside of the head lamp (or rear lamp).

[0255] Hereinafter, the operation that the processor 870 controls (changes, varies) the light output direction of the head lamp (or rear lamp) may be performed through at least one of the components of the head lamp (or rear lamp), the housing or the deformation member. However, the present invention may not be limited to this. The present invention may alternatively employ every means, configuration, function or the like, capable of varying (changing) the light output direction of the head lamp.

[0256] The technology of varying the light output direction of the head lamp (or rear lamp) corresponds to a generally-known technology, so detailed description thereof will be omitted.

[0257] Meanwhile, at least one of the plurality of lamps disclosed herein may include a plurality of light sources. The at least one of the plurality of lamps may be provided with the plurality of light sources in a matrix configuration or a micro configuration. Also, the plurality of light sources may be provided in a matrix configuration in a size of a micro unit.

[0258] Each of the plurality of light sources may be a halogen lamp, a light emitting diode (LED) or a laser diode (LD).

[0259] The plurality of light sources may be controlled individually. The processor 870 may control the plurality of light sources individually (or independently).

[0260] Here, the individual control of the plurality of light sources may include the meaning that the plurality of light sources can be individually turned on/off, light output brightness (or output intensity) of light of the plurality of light sources can be individually adjusted, and the light output directions of the plurality of light sources can be individually varied.

[0261] For example, the processor 870 may control some of the plurality of light sources to output light in a first output direction and the other of the plurality of light sources to output light in a second output direction different from the first output direction.

[0262] As another example, the processor 870 may control some of the plurality of light sources, which are provided in at least one of the plurality of lamps 810, to output light toward the front of the vehicle and the other of the plurality of light sources to output light to an object detected by the sensing unit 120 or 860. When the detected object is located before (in front of) a side of the vehicle or before an upper side of the vehicle, at least one of the plurality of lamps may output light into two ways.

[0263] Meanwhile, the rear lamps may output visible light to the rear of the vehicle when the brake apparatus

is driven or operated. The brake apparatus, for example, may be operated when the user depresses the brake pedal.

[0264] The rear lamps may emit (output) light to the rear of the vehicle even when the brake apparatus is operated by an Automatic Emergency Braking (AEB) system as well as when the brake apparatus is driven in response to the brake pedal provided in the vehicle being depressed.

[0265] A function (or system) of operating (working) the brake apparatus 153 when a potential collision of the vehicle is more than a reference value even though the brake pedal is not depressed may be referred to as an AEB system.

[0266] The AEB system may be one of main functions of an Adaptive Driving Assistance System (ADAS), which may remarkably enhance safety of the vehicle.

[0267] Also, the brake apparatus may be understood as a concept including at least one of a hydraulic brake that is operated by a brake paddle, an engine brake that decelerates a vehicle by increasing an engine speed (engine RPM) using friction between the engine and a gearbox, and a parking brake.

[0268] The operation in which the rear lamps 154 emit light in response to the operation of the brake apparatus may be performed under the control of the processor 870 of the control device 800 (or the controller 170).

[0269] Also, in hardware (or electric) configuration, the vehicle 100 disclosed herein may be pre-designed in a manner that the rear lamps emit visible light to the rear of the vehicle, without the control of a separate component (e.g., the controller 170 or the control device 800 (processor 870)), when the brake apparatus is operated.

[0270] Meanwhile, the vehicle control device 800 according to the present invention may include a sensing unit 860.

[0271] The sensing unit 860 may be the object detecting apparatus 300 illustrated in FIG. 7, or the sensing unit 120 provided in the vehicle 100.

[0272] The sensing unit 860 may be implemented by combining at least two of the camera 310, the radar 320, the LiDAR 330, the ultrasonic sensor 340, the infrared sensor 350 and the sensing unit 120 provided in the object detecting apparatus 300.

[0273] The sensing unit 860 may sense information related to the vehicle 100.

[0274] The vehicle-related information may be at least one of vehicle information (or a driving state of the vehicle) and surrounding information of the vehicle.

[0275] For example, the vehicle information may include a driving speed of the vehicle, a weight of the vehicle, a number of persons in the vehicle, braking force of the vehicle, the maximum braking force of the vehicle, a driving mode of the vehicle (an autonomous driving mode or a manual driving mode), a parking mode of the vehicle (an autonomous parking mode, a automatic parking mode or a manual parking mode) and the like.

[0276] The surrounding information of the vehicle, for

example, may include a state (frictional force) of a road surface on which the vehicle is currently moving, the weather, a distance from a front (or rear) vehicle, a relative speed of a front (or rear) vehicle, a curvature of a curve when a currently-driving lane is curved, and the like.

[0277] Also, the surrounding information of the vehicle (or surrounding environment information) may include external information regarding the vehicle (e.g., ambient brightness, temperature, a position of the sun, information regarding subjects around the vehicle (e.g., persons, other vehicles, traffic signs, etc.), a type of a currently-driving road surface, a feature (landmark), line information, driving lane information, and information required for an autonomous driving/autonomous parking/automatic parking/manual parking mode.

[0278] The surrounding information of the vehicle may further include a distance between the vehicle 100 and an object present near the vehicle, a type of the object, an available parking space for the vehicle, an object (e.g., a parking line, a string, another vehicle, a wall, etc.) for identifying a parking space, and the like.

[0279] Hereinafter, description will be given under assumption that the sensing unit 860 is separately provided in the vehicle control device 800. Obtaining information by the processor 870 through the sensing unit 860 may be understood as the processor 870 acquiring information using at least one of the object detecting apparatus 300 and the sensing unit 120 provided in the vehicle 100.

[0280] The vehicle control device 800 according to the present invention may include the processor 870 capable of controlling the plurality of lamps 810 and the sensing unit 860.

[0281] The processor 870 may be the controller 170 illustrated in FIG. 7.

[0282] The processor 870 may control the components illustrated in FIG. 7.

[0283] The processor 870 included in the vehicle control device 800 according to the present invention may turn on a lamp, which enters an area adjacent to an available parking space, of the plurality of lamps in a preset manner, when the sensing unit 860 senses that the vehicle 100 enters the area.

[0284] Here, turning the lamp on in the preset manner, for example, may mean turning the lamp on continuously, irrespective of a type of each lamp and a specific (unique) lighting method of each lamp.

[0285] With the configuration, the present invention can output more light to a parking space and surroundings of the parking space by continuously turning on at least one of the plurality of lamps while parking the vehicle, thereby increasing ambient brightness of the parking space. This may remarkably increase a recognition rate of recognizing the parking space and an object existing near the parking space. When the recognition rate increases, an autonomous/automatic parking success rate can increase and a warning signal according to objects near the vehicle can be more accurately notified to

the user in the manual parking mode, thereby reducing an accident rate.

[0286] Hereinafter, description will be given in more detail of a vehicle control device capable of controlling lamps in an optimized manner upon parking a vehicle, and a method for controlling the vehicle, with reference to the accompanying drawings.

[0287] FIG. 9 is a flowchart illustrating a representative control method according to the present invention, and FIGS. 10, 11A, 11B and 11C are conceptual views illustrating the control method illustrated in FIG. 9.

[0288] The control method illustrated in FIG. 9 may be executed by the control of the vehicle control device 800 (or the processor 870) or by the control of the controller 170 of the vehicle 100.

[0289] Also, every detail to be described hereinafter will be equally/selectively applied to a manual parking mode, an automatic parking mode and an autonomous parking mode.

[0290] The manual parking mode may refer to a mode of executing parking by a driver's manipulation.

[0291] The automatic parking mode may be a mode in which a vehicle is automatically parked into a corresponding available parking space based on a user setting according to a preset algorithm, near the available parking space.

[0292] The autonomous parking mode may refer to a mode in which the vehicle 100 detects or searches for an available parking space by itself at an arbitrary place, moves to the corresponding parking space in an autonomous driving manner, and then executes automatic parking.

[0293] Referring to FIGS. 9 and 10, it is sensed through the sensing unit 860 that the vehicle 100 enters an area 1100 adjacent to an available parking space 1000 (S910).

[0294] The processor 870 may sense information related to the vehicle through the sensing unit 860. Here, one of the vehicle-related information may be the available parking space and/or an area adjacent to the parking space.

[0295] The processor 870 may detect the available parking space when a preset condition is met.

[0296] The preset condition may refer to a condition that it is determined that the vehicle is to execute parking, and may be associated with at least one of a speed of the vehicle, a position of the vehicle, an entry into a parking mode in response to a user request, a gear state and a surrounding environment.

[0297] For example, the processor 870 may detect the parking space when the speed of the vehicle 100 is less than a predetermined speed, or the position of the vehicle is within a parking-available area (e.g., parking lot, etc.).

[0298] As another example, the processor 870 may detect the parking space when the vehicle is switched into the autonomous parking mode or the automatic parking mode by the user or the gear of the vehicle is changed from a forward gear into a reverse gear.

[0299] As another example, the processor 870 may detect the parking space when the surrounding environment detected through the sensing unit 860 (e.g., camera) is determined as a parking-available area.

[0300] The processor 870 may decide (sense, detect, extract, determine) the available parking space in various manners.

[0301] Referring to FIG. 10, when a parking line *l* is sensed and it is determined that parking is available at an inner space of the parking line *l*, the processor 870 may sense the inner space as the parking space 1000.

[0302] As another example, when at least one another vehicle 1130a and 1130b is sensed through the sensing unit 860 and it is determined that parking is available at a space spaced from the sensed another vehicle 1130a, 1130b by a predetermined distance *d*₁, the processor 870 may sense the space as the parking space 1000.

[0303] For example, the processor 870 may determine whether or not a corresponding sensed space is a parking-available space on the basis of a size (width, length) of the vehicle and the sensed space.

[0304] The processor 870 may decide an area 1100 adjacent to the parking space 1000 based on the sensed parking space 1000.

[0305] The adjacent area 1100 may be an area existing within a predetermined distance *s* from the parking space 1000.

[0306] Here, as illustrated in FIG. 10, the adjacent area 1100 may be an area existing within a predetermined distance *s* based on a first line (inner line) *l*₁ of a parking line dividing the parking space 1000. In addition, the adjacent area 1100 may be an area existing within the predetermined distance *s* based on a second line (outer line) *l*₂ of the parking line dividing the parking space 1000.

[0307] The adjacent area 1100 may be formed adjacent to an outer side of the parking space 1000.

[0308] The predetermined distance *s* may be decided by the processor 870 according to a preset algorithm or set/changed according to a user manipulation. The predetermined distance *d*₁ may also be decided by the processor 870 according to a preset algorithm or set/changed according to a user manipulation.

[0309] The processor 870 may detect an entry of a part of the vehicle 100 into the area 1100 adjacent to the parking space 1000.

[0310] Referring back to FIG. 9, a lamp which enters the area 1100 (the area adjacent to the parking space) of the plurality of lamps (hereinafter, a reference numeral 1120 is provided) provided on the vehicle is turned on in a preset manner (S920).

[0311] The vehicle 100 may be provided with a plurality of lamps 1120. For example, as illustrated in FIG. 10, the plurality of lamps 1120 may include head lamps 1120a and 1120b, and rear lamps 1120c and 1120d (lamps provided on side surfaces of the vehicle although not illustrated).

[0312] The plurality of lamps 1120a, 1120b, 1120c and 1120d, as illustrated in FIG. 10, may be provided on dif-

ferent positions of the vehicle from one another.

[0313] The processor 870 may decide (identify, determine, detect, sense, extract) a lamp, which enters the area 1100 adjacent to the parking space 1000, of the plurality of lamps through the sensing unit 860.

[0314] The processor 870 may turn on the lamp entered in the area 1100 in a preset manner.

[0315] Here, the preset manner may be a manner of continuously turning on the lamp, irrespective of a type of each of the plurality of lamps and a specific lighting method of each lamp.

[0316] For example, when a head lamp of the plurality of lamps enters the area 1100, the entered head lamp can continuously be lighted on even without a separate user manipulation through the mechanical input unit 214 or the lamp operating unit 650. In this instance, the head lamp may continuously output a low beam or high beam, or continuously output both of the low beam and the high beam.

[0317] Also, for a turn indicator lamp included in the head lamp, the processor 870 may control the turn indicator light included in the head lamp to be continuously turned on, irrespective of a specific lighting method (e.g., turning on/off the lamp with a predetermined period (a flicking method)).

[0318] As another example, when a rear lamp of the plurality of lamps enters the area 1100, the processor 870 may continuously turn on the rear lamp, irrespective of various types of lamps included in the rear lamp and a specific lighting method of each lamp, even though the brake apparatus is not operated (or the gear is not changed into a reverse gear).

[0319] Also, for a turn indicator lamp included in the rear lamp, the processor 870 may control the turn indicator lamp included in the rear lamp to be continuously turned on, irrespective of a specific lighting method (e.g., turning on/off the lamp at a predetermined period (a flicking method)).

[0320] As such, the present invention can continuously turn on a lamp moved into the area 1100 adjacent to the parking space 1000, of the plurality of lamps 1120 provided on the vehicle, so as to increase light intensity and brightness around the parking space, thereby remarkably increasing a recognition rate that a camera and various sensors included in the sensing unit 860 sense information required for parking.

[0321] Meanwhile, the processor 870 may light on the plurality of lamps 1120 provided on the vehicle in the preset manner in the order of entering the area 1100 adjacent to the parking space 1000.

[0322] As illustrated in (a) of FIG. 11A, the processor 870 may continuously turn on the fourth lamp 1120d when the fourth lamp 1120d of the plurality of lamps 1120 provided on the vehicle enters the area 100 adjacent to the parking space 1000.

[0323] Afterwards, as parking of the vehicle is executed, as illustrated in (b) of FIG. 11A, when the third lamp 1120c of the plurality of lamps 1120 provided on the ve-

hicle 100 enters the adjacent area 1100 after the entry of the fourth lamp 1120d into the area 1100, the processor 870 may also continuously turn on the third lamp 1120c.

[0324] In this manner, the processor 170 may turn on the plurality of lamps 1120 provided on the vehicle 100 in the preset manner (continuously) in the order of entering the area 1100 adjacent to the parking space 1000.

[0325] Meanwhile, the processor 870 may keep turning on the plurality of lamps 1120 in the preset manner even though the plurality of lamps 1120 enter the parking space 100 through the adjacent area 1100.

[0326] As illustrated in FIG. 11B, in a state that at least one lamp 1120c, 1120d of the plurality of lamps 1120 is turned on in the preset manner, in response to entering the area 1100 adjacent to the parking space 1000, when the at least one lamp 1120c, 1120d enters the parking space 1000 through the adjacent area 1100, the processor 870 may keep turning on the at least one lamp 1120c, 1120d in the preset manner.

[0327] With the configuration, the present invention can maintain an increase state of intensity and brightness of light emitted to the parking space and the adjacent area even though the vehicle enters the parking space, thereby continuously increasing the recognition rate of the sensor detecting the surrounding environment (surrounding information) until completely parking the vehicle.

[0328] Meanwhile, the processor 870 may keep turning on the lamps in the preset manner until parking is completed (e.g., until a time point that the gear is changed to a parking gear), or turn off the lamps turned on in the preset manner on the basis of the entry of the vehicle 100 in the parking space 100 or on the basis of a movement of the vehicle 100 by a predetermined distance after entering the parking space 1000.

[0329] As illustrated in FIG. 11A, the processor 870 may light on the lamps 1120a, 1120b and 1120c, which does not enter the area 1100 adjacent to the parking space 1000 of the plurality of lamps 1120, with a predetermined period.

[0330] Here, turning on with the predetermined period refers to controlling the lamps to be turn on/off with the predetermined period, for example, may be understood as a specific lighting method of an emergency lamp (a method of flicking the emergency lamp).

[0331] The processor 870 may turn on the non-entered other lamps with a predetermined period, based on an entry of at least one of the plurality of lamps 1120 in the adjacent area 1100.

[0332] Also, the processor 870 may turn on the plurality of lamps 1120 with a predetermined period when the vehicle is switched into an autonomous parking mode or an automatic parking mode by a user manipulation.

[0333] In this instance, in the state that the plurality of lamps 1120 are turned on with the predetermined period, when at least one of the plurality of lamps 1120 enters the adjacent area 1100, the processor 870 may turn on the at least one lamp entered in the area 1100 in a preset

manner (continuously).

[0334] Meanwhile, the present invention may not be limited to this. Lamps which have not entered the adjacent area 1100 yet may be controlled to be turned on by a specific lighting method which is set for a type of each lamp. That is, the non-entered lamps may not be turned on without a separate user input or an operation of a component of the vehicle.

[0335] The foregoing description has been given of the embodiment in which at least one of the plurality of lamps provided on the vehicle is turned on in the preset manner, in response to the at least one lamp entering the area 1100 adjacent to the parking space 1000. However, the present invention may not be limited to this.

[0336] The processor 870 may also turn on at least one of the plurality of lamps 1120 provided on the vehicle in the preset manner, in response to the at least one lamp entering the parking space 1000.

[0337] Here, the preset manner, as aforementioned, may be a manner of continuously turning the lamp on, irrespective of a type of each lamp and a specific (unique) lighting method of each lamp.

[0338] For example, when it is set that a lamp is turned on in the preset manner, in response to the entry in the parking space 1000, as illustrated in (a) of FIG. 11C, even though at least one of the plurality of lamps enters the area 1100 adjacent to the parking space 1000, the at least one lamp may not be turned on in the preset manner.

[0339] On the other hand, as illustrated in (b) of FIG. 11C, when at least one of the plurality of lamps 1120 enters the parking space 1000 during parking of the vehicle, the processor 870 may turn on the entered lamp in the preset manner.

[0340] Also, when the at least one of the plurality of lamps 1120 enters the parking space 1000, the processor 870 may turn on the other lamps without entering the parking space 1000 with a predetermined period.

[0341] In this manner, the present invention can turn on the plurality of lamps in the preset manner (continuously) based on the entry in the area 1100 adjacent to the parking space 1000, or based on the entry in the parking space 1000.

[0342] Which one of the operating methods is to be used may be decided by a user manipulation or predetermined when manufacturing the vehicle at a factory. Also, this method may be changed by a user manipulation.

[0343] For the sake of explanation, the present invention will be described under assumption that one of the plurality of lamps is turned on in a preset manner when the one lamp enters the area 1100 adjacent to the parking space 1000. However, details described in relation to this will be equally/similarly applied even when one of the plurality of lamps enters the parking space 1000.

[0344] Hereinafter, various embodiments according to the present invention will be described with reference to the accompanying drawings.

[0345] FIGS. 12A, 12B, 13, 14 and 15 are conceptual views illustrating a method of controlling lamps provided

on a vehicle in accordance with various embodiments of the present invention.

[0346] The processor 870 of the vehicle control device 800 according to the present invention may turn on different lamps in the preset manner (continuously) according to a direction of the vehicle 100 that enters the parking space 1000.

[0347] As illustrated in (a) of FIG. 12A, when the vehicle 100 enters the area 1100 adjacent to the parking space 1000, starting from a front surface of the vehicle 100, the processor 870 may continuously turn on the lamps 1120a and 1120b provided on the front surface of the vehicle 100 of the plurality of lamps 1120.

[0348] As illustrated in (b) of FIG. 12A, when the vehicle 100 enters the area 1100 adjacent to the parking space 1000, starting from a rear surface of the vehicle 100, the processor 870 may continuously turn on the lamps 1120c and 1120d provided on the rear surface of the vehicle 100 of the plurality of lamps 1120.

[0349] Here, the lamps 1120a and 1120b provided on the front surface or the lamps 1120c and 1120d provided on the rear surface may continuously be turned on, in response to entering the area 1100 adjacent to the parking space 1000.

[0350] Without a limit to this, the lamps 1120a and 1120b provided on the front surface or the lamps 1120c and 1120d provided on the rear surface may be implemented (set) to be continuously turned on, in response to entering the parking space 1000.

[0351] Also, when the vehicle 100 executes parallel parking, a lamp provided on one side surface which is closer to the parking space of a plurality of side surfaces of the vehicle 100 may continuously be turned on.

[0352] For example, as illustrated in (a) of FIG. 12B, when the vehicle 100 executes parallel parking, the processor 870 may continuously turn on the lamp 1120c provided on the one side surface which is closer to the parking space 1000 of the plurality of lamps 1120.

[0353] Here, the one side surface is a side surface closer to the parking space of left side surface and right side surface of the vehicle, namely, corresponds to the left side surface based on FIG. 12B.

[0354] In this instance, the processor 870 may continuously turn on the lamp 1120c entering the area 1100 adjacent to the parking space 1000, of the left lamp 1120a of the head lamps 1120a and 1120b and the left lamp 1120c of the rear lamps 1120c and 1120d.

[0355] Meanwhile, the processor 870 may also continuously turn on a lamp, which has not entered the adjacent area, of the plurality of lamps provided on the one side surface, when the vehicle executes the parallel parking.

[0356] As illustrated in (b) of FIG. 12B, when the vehicle executes the parallel parking and the one side surface adjacent to the parking space 1000 is a left side surface, the processor 870 may continuously turn on the lamp 1120a without entering the adjacent area 1100 of the plurality of lamps 1120a and 1120c provided on the left side surface.

[0357] Upon executing the parallel parking, it is important to sense a surrounding environment of the front of the vehicle. Therefore, the present invention can provide an effect of remarkably reducing a traffic accident rate occurred during the parallel parking, by virtue of the configuration illustrated in (b) of FIG. 12B.

[0358] Meanwhile, as aforementioned, at least one of the plurality of lamps 1120 provided on the vehicle 100 may vary a direction of outputting light, namely, a light output direction.

[0359] Referring to FIG. 13, the processor 870 may turn on the lamps 1120a and 1120b entering the area 1100 adjacent to the parking space 1000 in the preset manner (continuous manner).

[0360] In this instance, the processor 870 may control a light output direction of the lamps 1120a and 1120b turned on in the preset manner (continuous manner) such that light can be output toward a center C of the parking space 1000.

[0361] When an available parking space for the vehicle is decided, the processor 870 may extract the center of the parking space. The processor 870 may decide whether the light output direction of a lamp provided in a moving direction of the vehicle (e.g., a reference line in parallel to the overall-length direction of the vehicle) faces the center C of the parking space.

[0362] When the light output direction of the lamp does not face the center C of the parking space, the processor 870 may change (control) the light output direction to face the center C of the parking space.

[0363] For example, when a head lamp enters the adjacent area, the processor 870 may control a cornering lamp (configured to vary the light output direction) provided on the head lamp in a manner that the light output direction of the cornering lamp, which is currently turned on in the preset manner, can be changed to a direction facing the center C of the parking space.

[0364] Meanwhile, the processor 870 may sense through the sensing unit 860 whether a specific object is present within a predetermined distance from the vehicle 100.

[0365] The processor 870 may control the plurality of lamp 1120 provided on the vehicle in different manners according to the sensing result.

[0366] Here, the specific object may refer to a preset type of object for deciding whether or not to control the plurality of lamps 1120 in different manners. For example, the specific object may be a person 1400a, another vehicle 1400b and the like.

[0367] As illustrated in (a) of FIG. 14, when the specific object 1400a or 1400b is sensed, the processor 870 may turn on only the lamps 1120c and 1120d, which have entered the area 1100 adjacent to the parking space 1000 of the plurality of lamps 1120 provided on the vehicle, in the preset manner (continuous manner).

[0368] In this instance, the other lamps 1120a and 1120b which have not entered the adjacent area 1100 yet may be turned on with a predetermined period.

[0369] Meanwhile, as illustrated in (b) of FIG. 14, when the specific object 1400a or 1400b is not sensed, the processor 870 may turn on all of the plurality of lamps 1120 in the preset manner (continuous manner).

[0370] In this instance, the processor 870 may turn on all of the plurality of lamps in the preset manner (continuous manner) based on that at least one of the plurality of lamps enters the adjacent area 1100 or the vehicle 100 is switched into an autonomous parking mode or an automatic parking mode.

[0371] With the configuration, the present invention may continuously turn on only lamps which have entered the area adjacent to the parking space (or the parking space) when a person or another vehicle is present near the vehicle during the parking of the vehicle, and turn on the other lamps with a predetermined period, thereby notifying that the parking is currently executed.

[0372] Also, the present invention may increase intensity of light output to surroundings of the vehicle and ambient brightness by continuously turning on all of the lamps, thereby helping parking of the vehicle.

[0373] Also, the processor 870 provided in the vehicle control device 800 may sense whether or not a preset object is present within the parking space 1000 or adjacent to the parking space 1000 through the sensing unit 860.

[0374] The preset object may be an object that may obstruct a movement of the vehicle during the parking. For example, as illustrated in FIG. 15, the present object may be an obstacle 1500a, another vehicle 1500b and a wall 1500c.

[0375] When the preset object is present, the processor 870, as illustrated in (a) of FIG. 15, may turn on the lamp 1120d which has entered the adjacent area 1100 in the preset manner (continuous manner).

[0376] Also, when the preset object is not present, the processor 870, as illustrated in (b) of FIG. 15, may not turn on the lamp entered in the adjacent area 1100 in the preset manner.

[0377] Here, that the lamp is not turned on by the present method may refer to that the lamp is turned on according to a type of each lamp and a specific (unique) lighting method. That is, the head lamp may be turned on according to a user request and the rear lamp may be turned on in response to the brake apparatus being driven.

[0378] With the configuration, the present invention can avoid interference with people near the vehicle due to the lamp being continuously turned on when parking of the vehicle is executed within a limited space. Therefore, ambient brightness can more increase for the driver of the vehicle who is parking the vehicle without trouble.

[0379] Also, the present invention may not turn on the lamp by the present method (continuously) when the vehicle is likely to move over the parking space, thereby preventing in advance people around the vehicle from being bothered due to the continuous turn-on of the lamp.

[0380] That is, the present invention can turn on the

lamp in the preset manner only when a preset object is present within the parking space or adjacent to the parking space for ensuring safeties of people or other vehicles around the vehicle, and turn on the lamp in a specific lighting manner according to a type of each lamp when a preset object is not present.

[0381] As aforementioned, this specification has been described, focusing on turning on at least one of the plurality of lamps provided on the vehicle, in the preset manner when the at least lamp enters the area adjacent to the parking space.

[0382] However, the present invention may not be limited to this, but may also be implemented in a manner of turning on at least one lamp moved in the parking space, of the plurality of lamps provided on the vehicle, in the preset manner when the at least one lamp enters the parking space.

[0383] According to embodiments of the present invention, at least one of the following effects can be obtained.

[0384] First, the present invention may continuously turn on at least part of a plurality of lamps provided on a vehicle to facilitate acquisition of surrounding information related to an available parking space upon parking the vehicle, thereby remarkably increasing an acquisition rate or recognition rate of the surrounding information regarding the available parking space.

[0385] Second, the present invention can help parking by increasing a recognition rate of a parking space or objects around the vehicle in a manner of continuously turning on at least part of the plurality of lamps upon parking the vehicle, and notify the ongoing parking of the vehicle to people or other vehicles around the vehicle using the other lamps.

[0386] The effects of the present invention may not be limited to those effects, and other effects which have not been mentioned can be obviously understood by those skilled in the art from the appending claims.

[0387] The vehicle control device 800 may be included in the vehicle 100.

[0388] Also, the operation or control method of the vehicle control device 800 may be equally/similarly applied to the operation or control method of the vehicle 100 (or controller 170).

[0389] For example, the control method for the vehicle (or the control method for the vehicle control device 800) may include sensing an entry of the vehicle into an area adjacent to an available parking space through the sensing unit, and turning on a lamp entered in the area of the plurality of lamps in a preset manner.

[0390] Also, the plurality of lamps may be provided on different positions of the vehicle, and the turning on the lamp may be configured to turn on the plurality of lamps in the preset manner in the order of entering the area.

[0391] Also, the turning on lamp may be configured to turn on the plurality of lamps in the preset manner even though the plurality of lamps enter the parking space through the area.

[0392] Here, the preset manner may be a manner of

continuously turning on the lamp, irrespective of a type of each lamp and a specific lighting method of each lamp.

[0393] The adjacent area may be an area which exists within a predetermined distance from the parking space.

[0394] Each of the steps may be executed by the controller 170 provided in the vehicle 100 as well as the vehicle control device 800.

[0395] Also, every function, configuration or control method executed by the vehicle control device 800 can be executed by the controller 170 provided in the vehicle 100. That is, every control method disclosed herein may be applied to the control method for the vehicle and even to the control method for the control device.

[0396] The present invention can be implemented as computer-readable codes in a program-recorded medium. The computer-readable medium may include all types of recording devices each storing data readable by a computer system. Examples of such computer-readable media may include hard disk drive (HDD), solid state disk (SSD), silicon disk drive (SDD), ROM, RAM, CD-ROM, magnetic tape, floppy disk, optical data storage element and the like. Also, the computer-readable medium may also be implemented as a format of carrier wave (e.g., transmission via an Internet). The computer may include the controller 180 of the terminal. Therefore, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be construed broadly within its scope as defined in the appended claims, and therefore all changes and modifications that fall within the metes and bounds of the claims, or equivalents of such metes and bounds are therefore intended to be embraced by the appended claims.

Claims

1. A vehicle control device (800), comprising:

a plurality of lamps (810) provided on a vehicle;
a sensing unit (860) configured to sense information related to the vehicle; and
a processor (870) configured to turn on a lamp in a preset manner, the lamp having entered an area adjacent to an available parking space of the plurality of lamps (810), when the sensing unit (860) senses that the vehicle has entered the area adjacent to the available parking space.

2. The device of claim 1, wherein the plurality of lamps (810) are provided on different positions of the vehicle, and
wherein the processor (870) is configured to turn on the plurality of lamps in the preset manner in the order of entering the area.

3. The device of any one of claims 1 and 2, wherein

the processor (870) is configured to keep turning on the plurality of lamps in the preset manner even though the plurality of lamps (810) enter the parking space through the area.

4. The device of any one of claims 1 to 3, wherein the preset manner is a manner of continuously turning on the plurality of lamps (810), irrespective of a type of each lamp and a specific lighting method of each lamp. 5
5. The device of any one of claims 1 to 4, wherein the adjacent area is an area existing within a predetermined distance from the parking space. 10
6. The device of any one of claims 1 to 5, wherein the processor (870) is configured to turn on lamps with a predetermined period, wherein the lamps have not entered the area yet of the plurality of lamps (810). 15
7. The device of any one of claims 1 to 6, wherein the processor (870) is configured to turn on a different lamp in the preset manner according to a direction that the vehicle enters the parking space. 20
8. The device of claim 7, wherein the processor (870) is configured to continuously turn on a lamp provided on a front surface of the vehicle of the plurality of lamps (810) when the vehicle enters the area adjacent to the parking space, starting from the front surface, and 25
wherein the processor (870) is configured to continuously turn on a lamp provided on a rear surface of the vehicle of the plurality of lamps (810) when the vehicle enters the area adjacent to the parking space, starting from the rear surface. 30
9. The device of any one of claims 7 and 8, wherein the processor (870) is configured to continuously turn on a lamp provided on one side surface, closer to the parking space, of a plurality of side surfaces of the vehicle when the vehicle executes parallel parking. 35
10. The device of claim 9, wherein the processor (870) is configured to continuously turn on even a lamp, which has not entered the adjacent area yet, of a plurality of lamps provided on the one side surface, when the vehicle executes the parallel parking. 40
11. The device of any one of claims 1 to 10, wherein at least one of the plurality of lamps (810) is configured to vary a light output direction, and 45
wherein the processor (870) is configured to control a light output direction of a lamp, turned on in the preset manner, to be directed to a center of the parking space. 50

12. The device of any one of claims 1 to 11, wherein the processor (870) is configured to sense through the sensing unit (860) whether or not a specific object is present within a predetermined distance from the vehicle, and is configured to control the plurality of lamps (810) in different manners according to the sensing result. 55

13. The device of claim 12, wherein the processor (870) is configured to turn on all of the plurality of lamps (810) in the preset manner when the specific object is not sensed, and 10
wherein the processor (870) is configured to turn on only a lamp entering the area, of the plurality of lamps (810), in the preset manner when the specific object is sensed. 15

14. The device of any one of claims 1 to 13, wherein the processor (870) is configured to sense through the sensing unit (860) whether or not a preset object is present within the parking space or adjacent to the parking space, 20
wherein the processor (870) is configured to turn on a lamp entering the area in the preset manner when the present object is present, and 25
wherein the processor (870) is configured to not turn on the lamp entering the area in the preset manner when the preset object is not present. 30

15. A vehicle (100) comprising the vehicle control device (800) according to one of claims 1 to 14. 35

FIG. 1

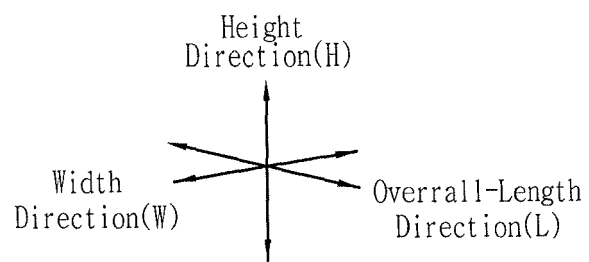
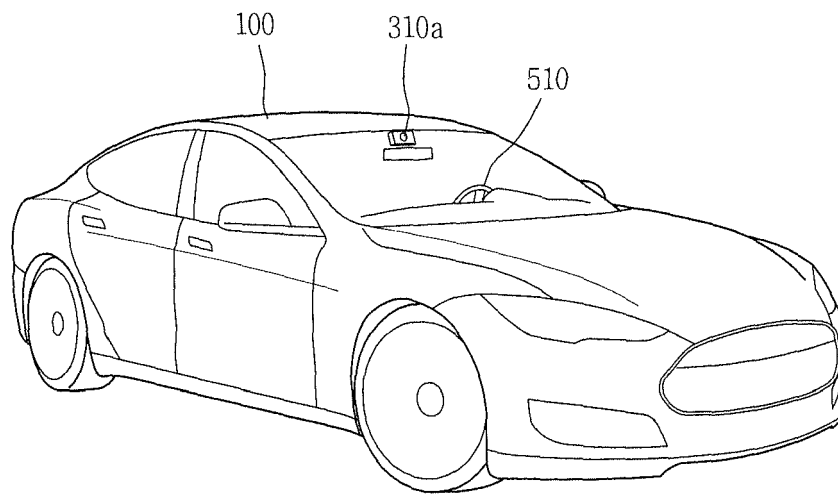


FIG. 2

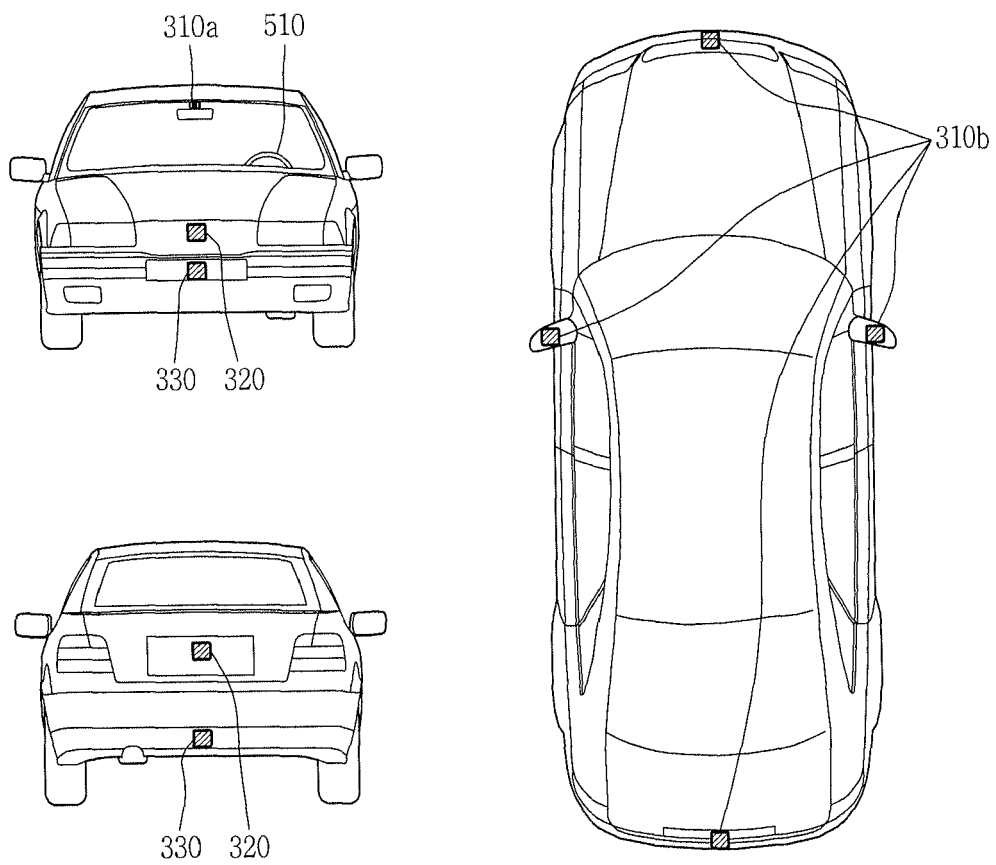


FIG. 3

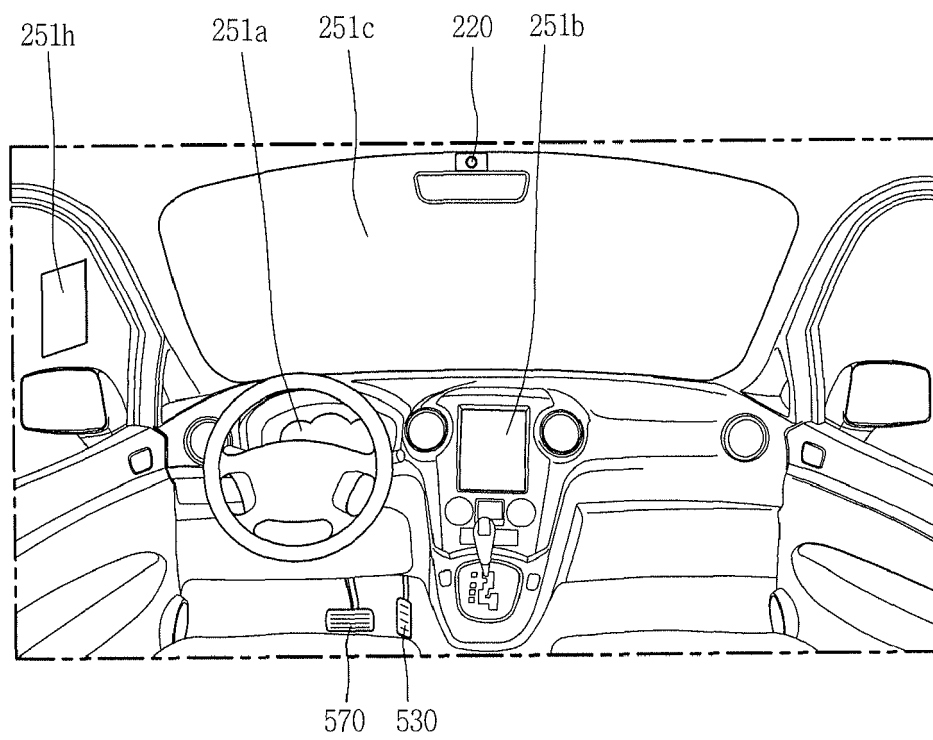


FIG. 4

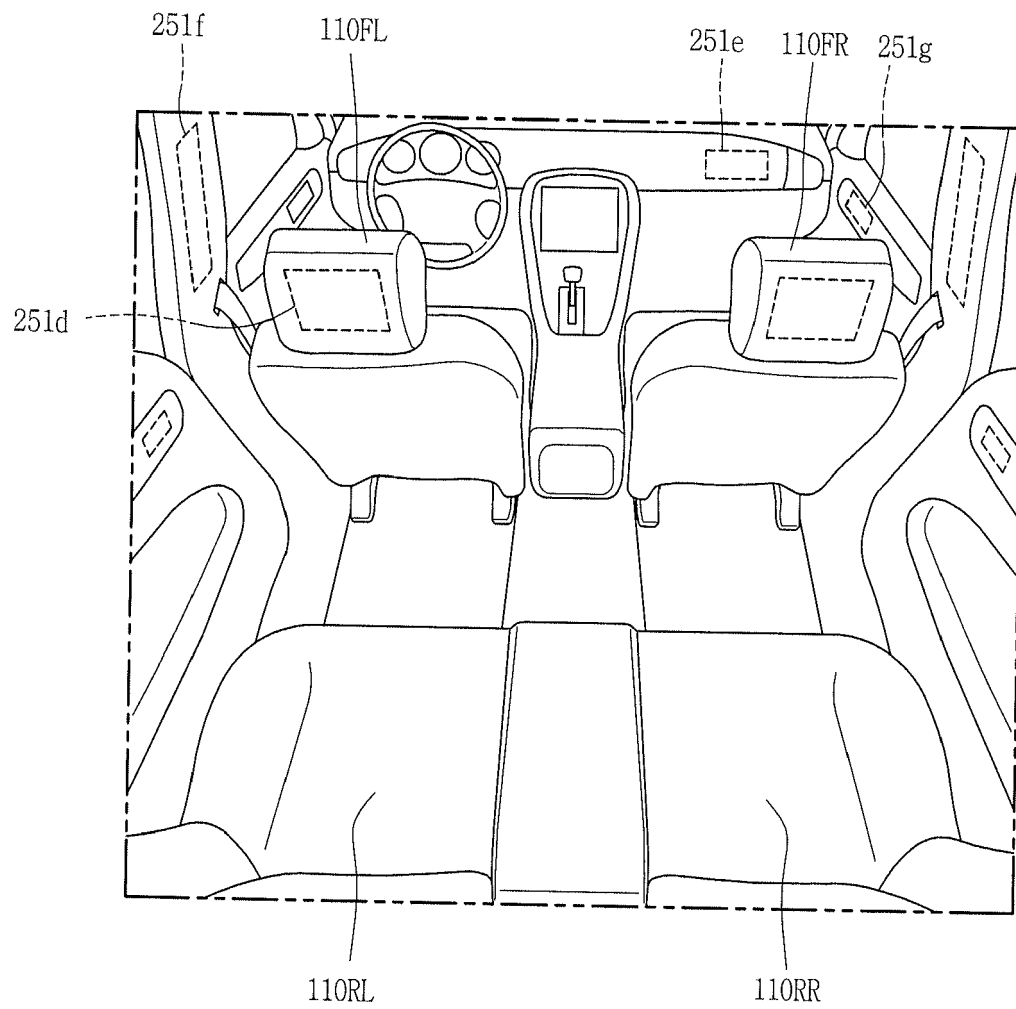


FIG. 5

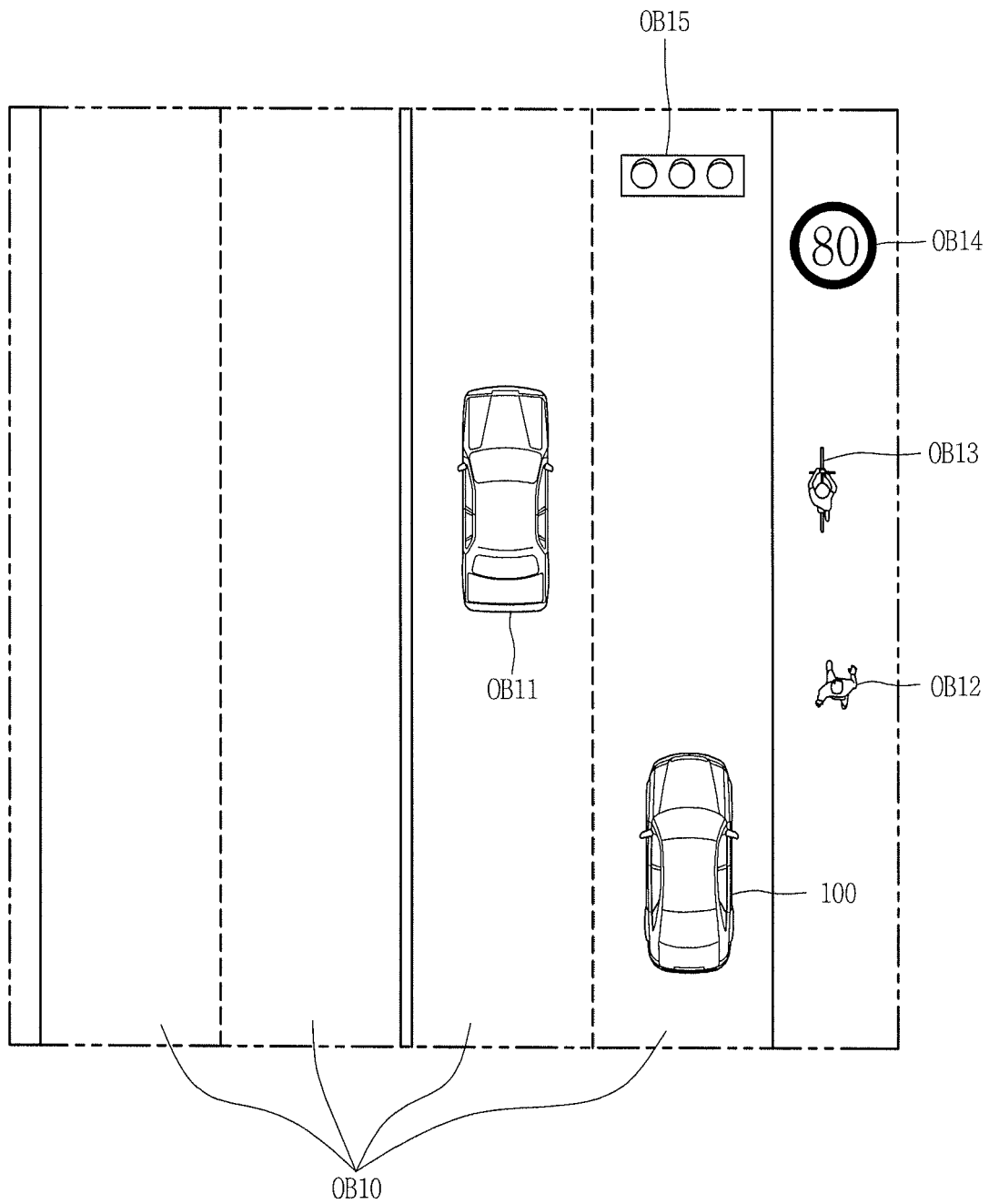


FIG. 6

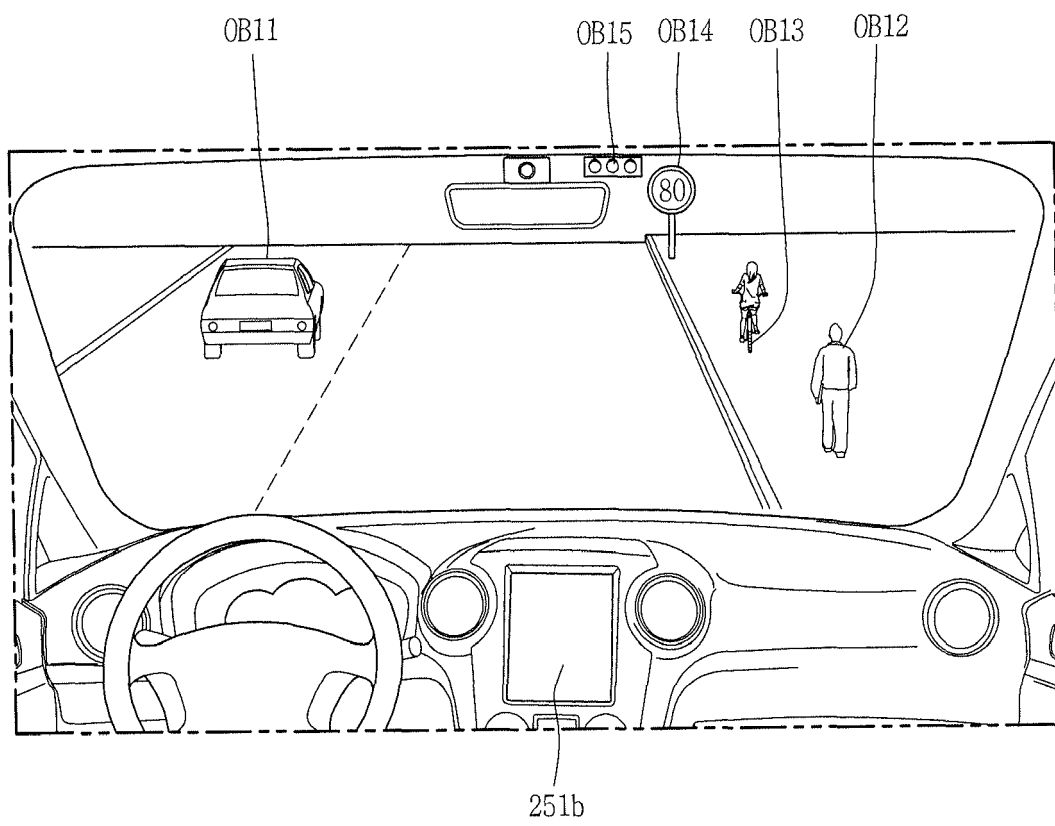


FIG. 7

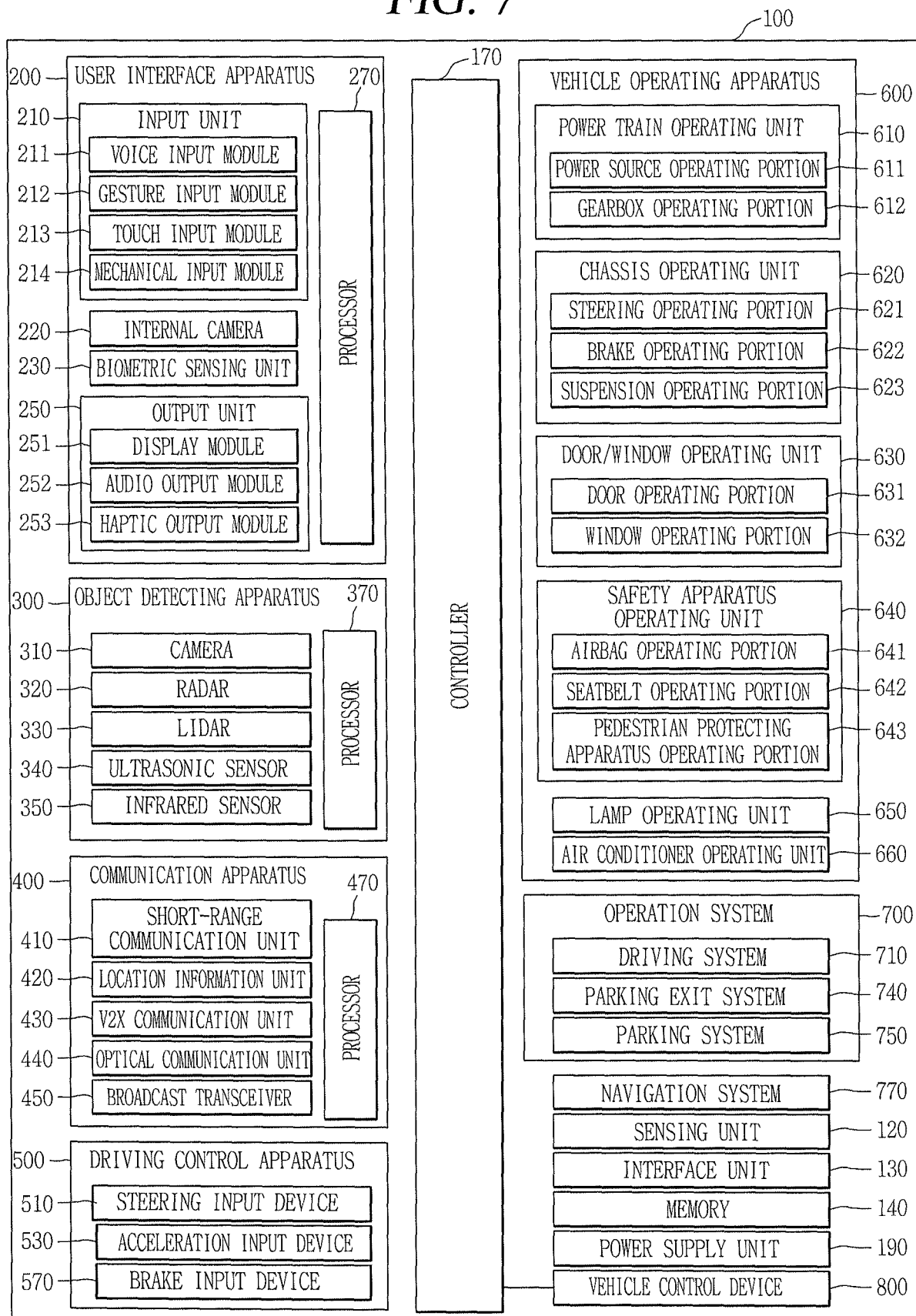


FIG. 8

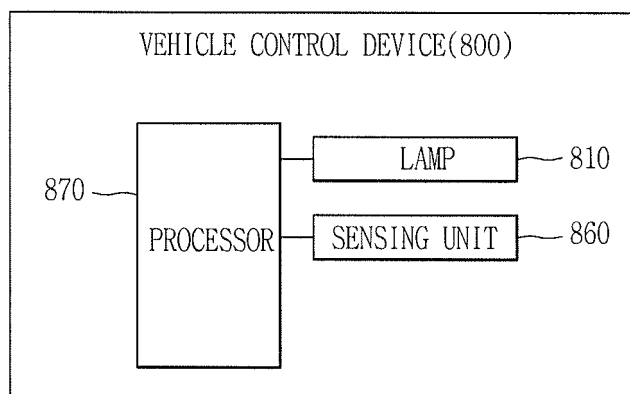


FIG. 9

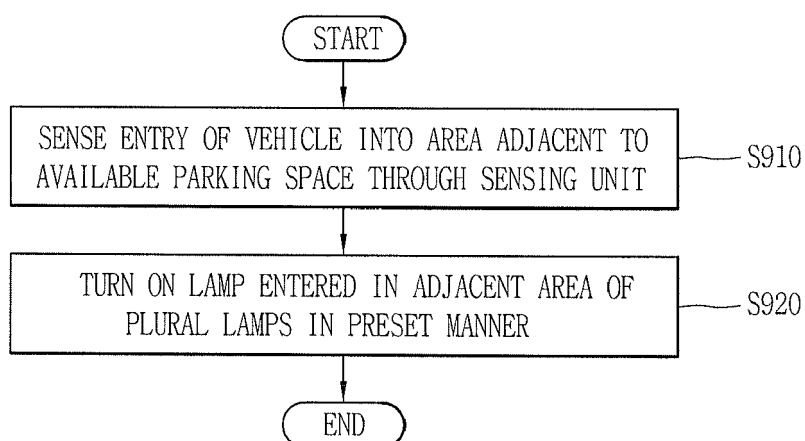


FIG. 10

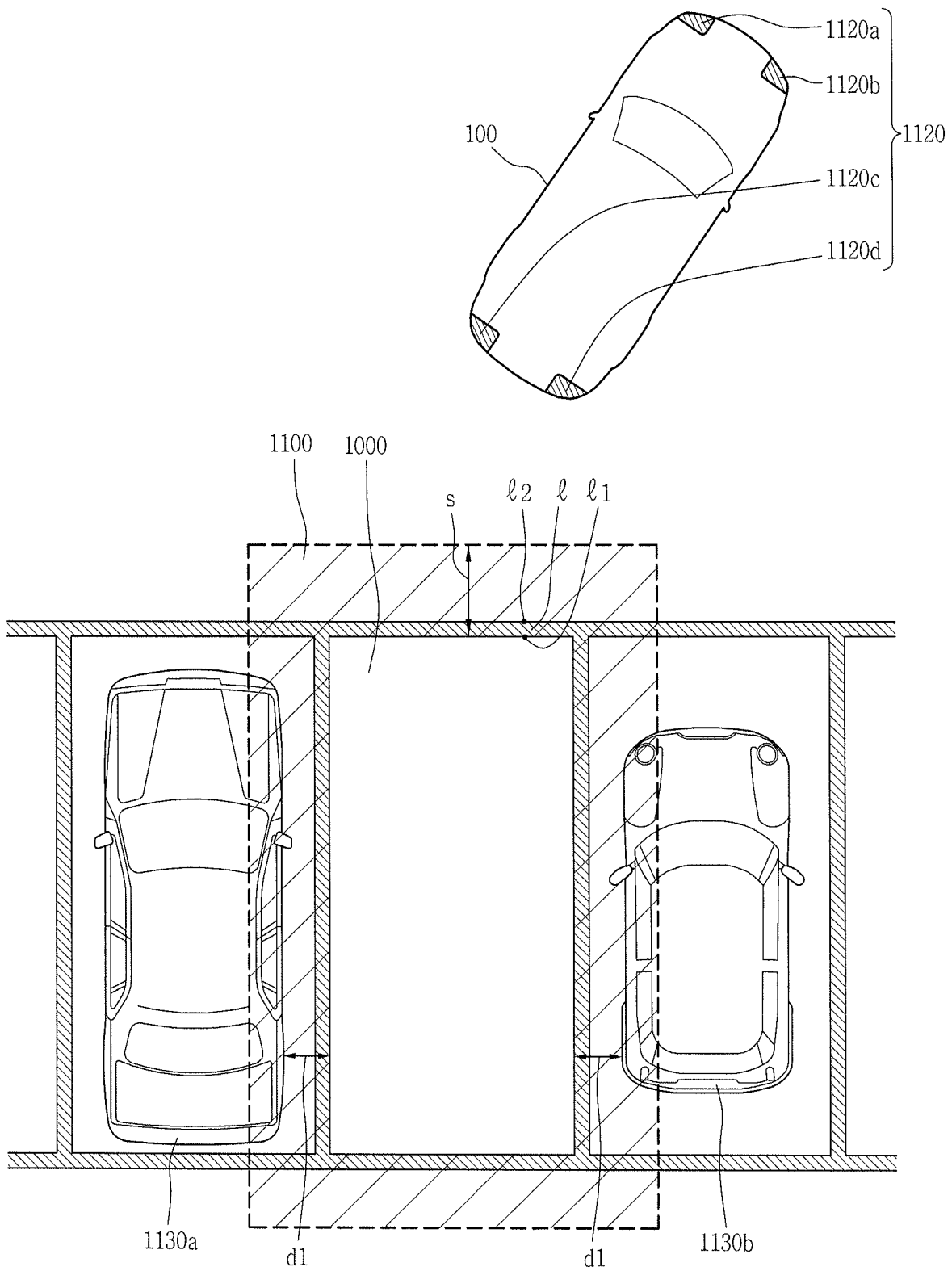


FIG. 11A

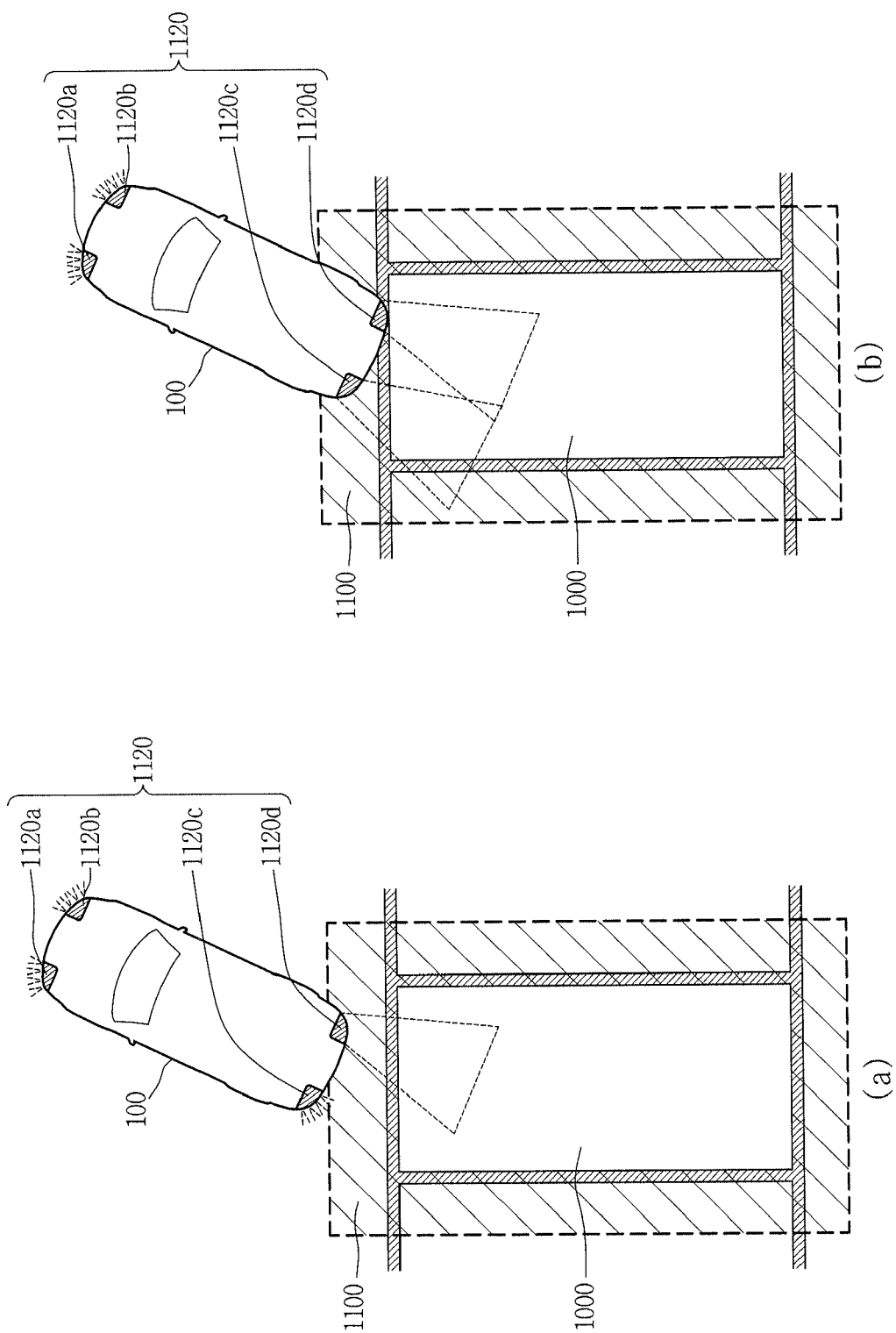


FIG. 11B

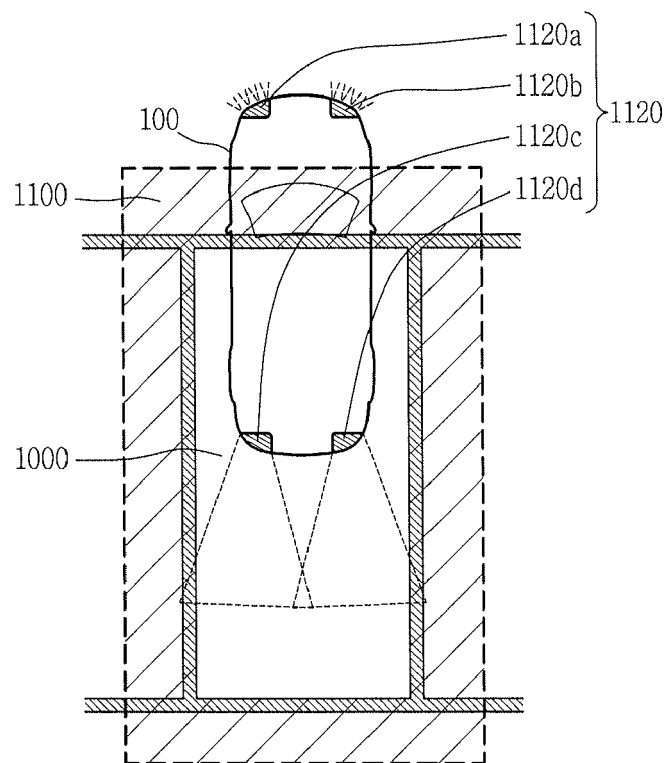


FIG. 11C

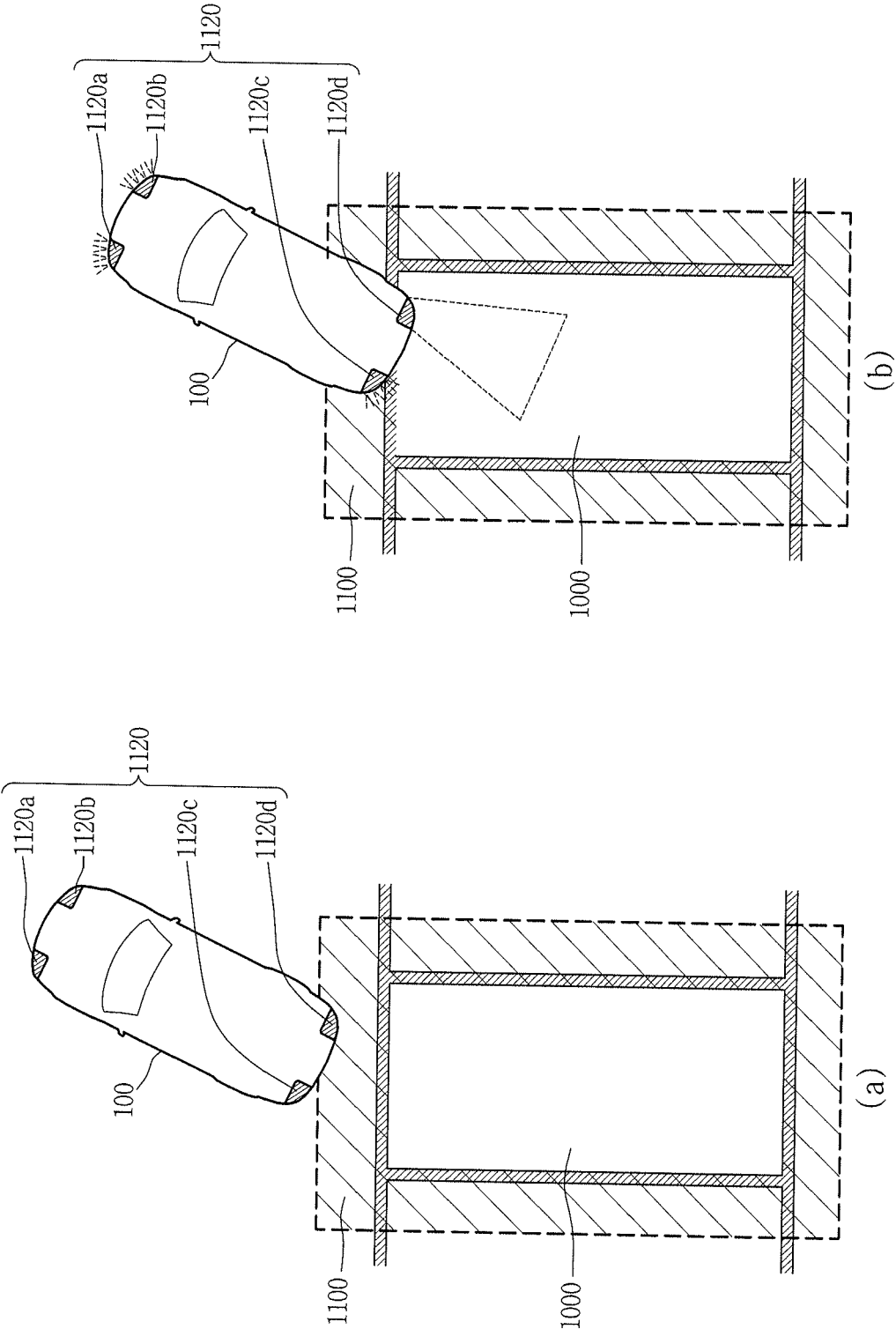


FIG. 12A

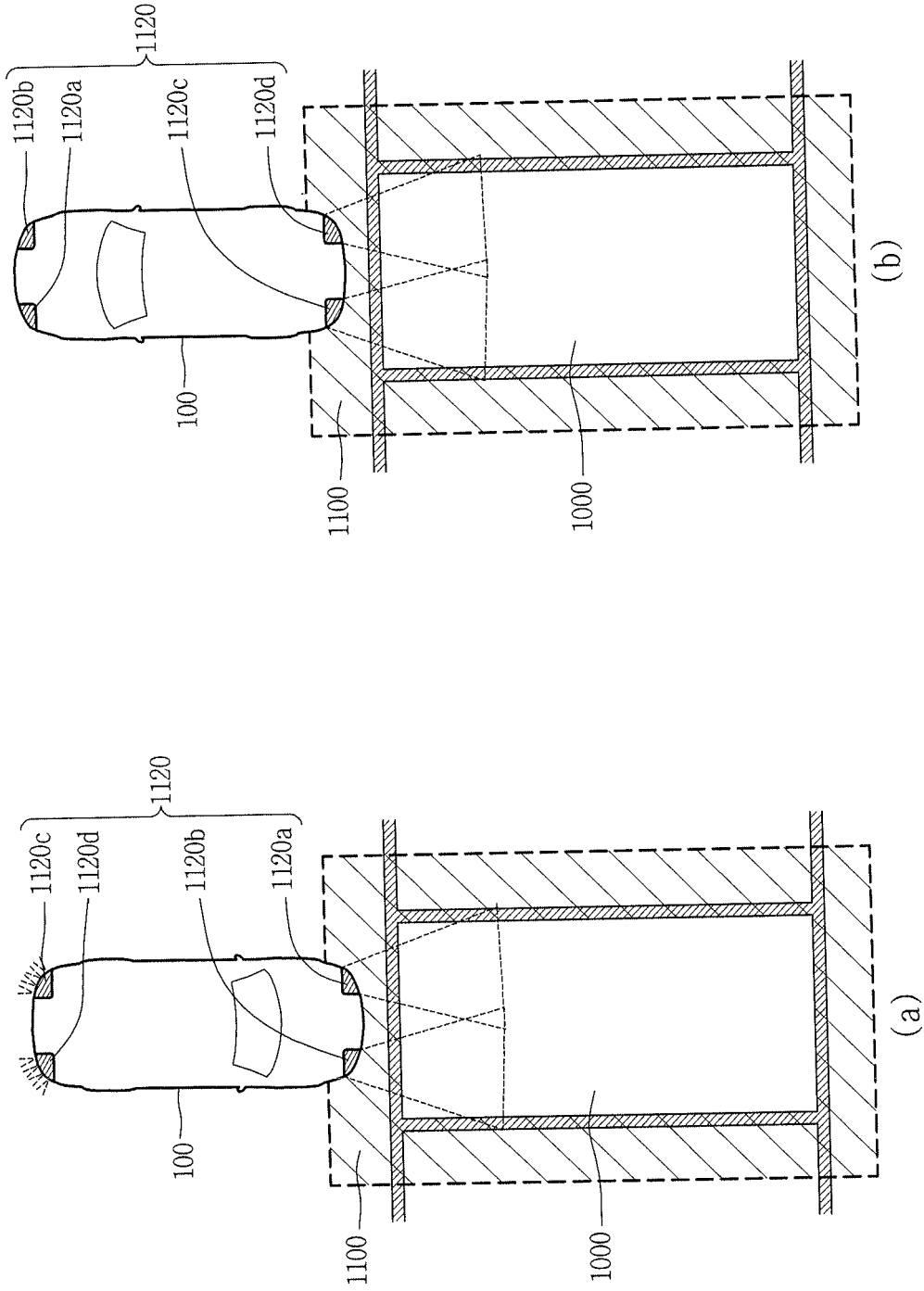


FIG. 12B

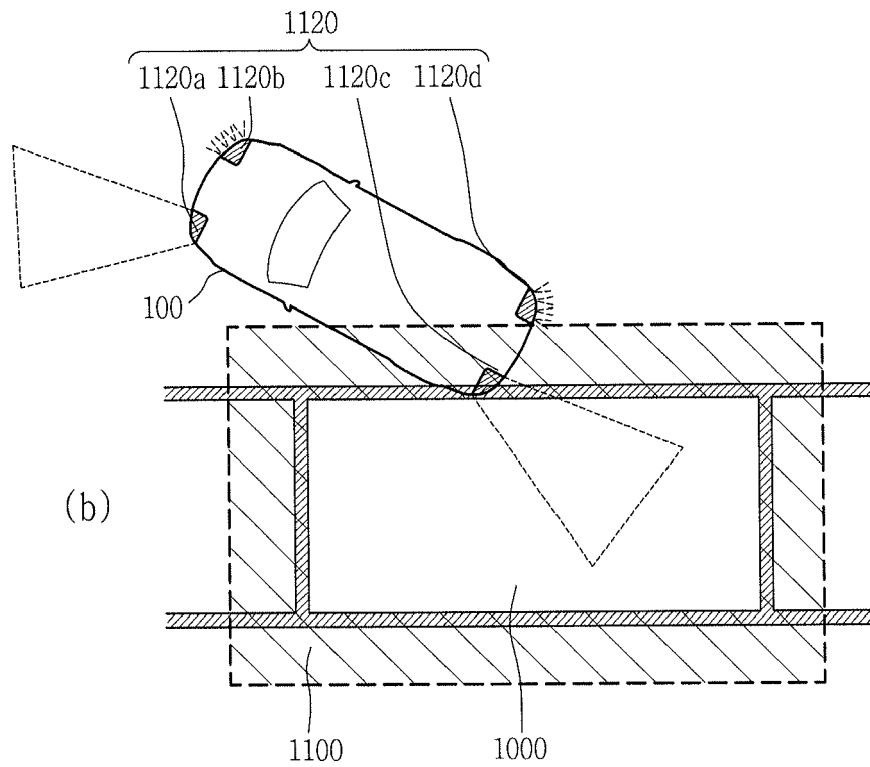
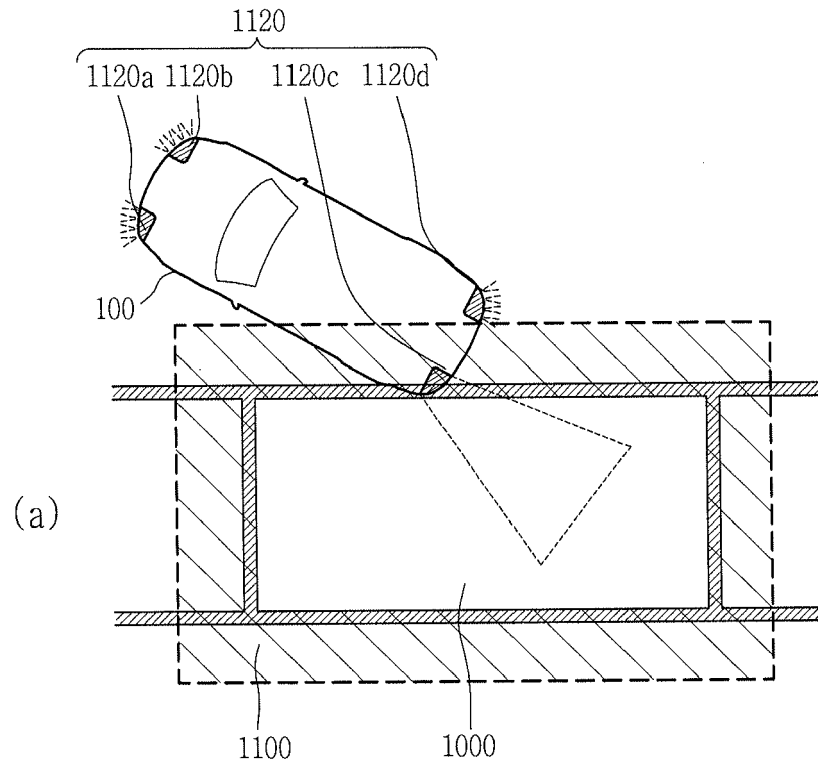


FIG. 13

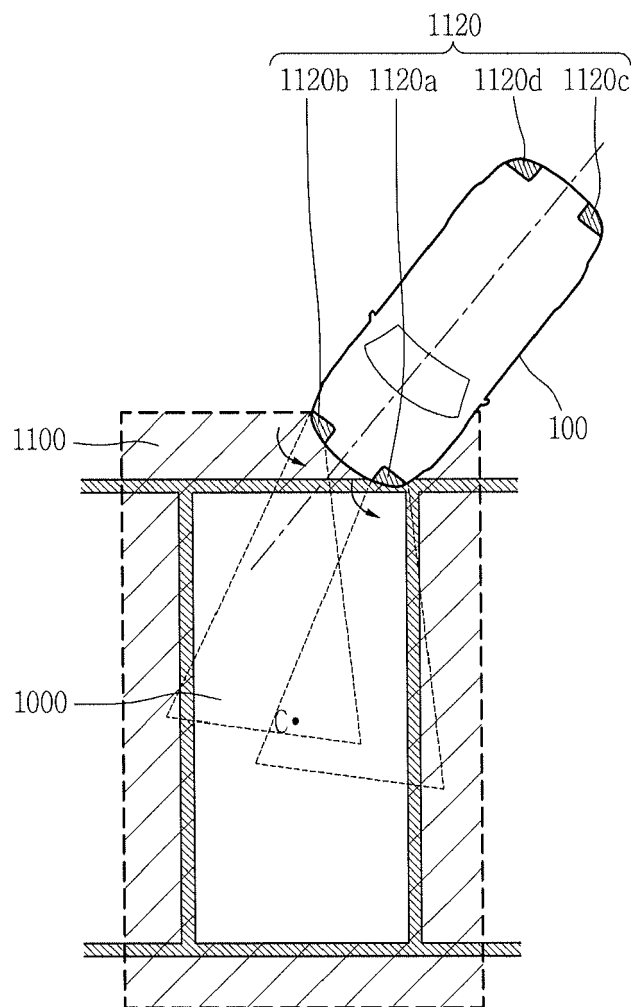


FIG. 14

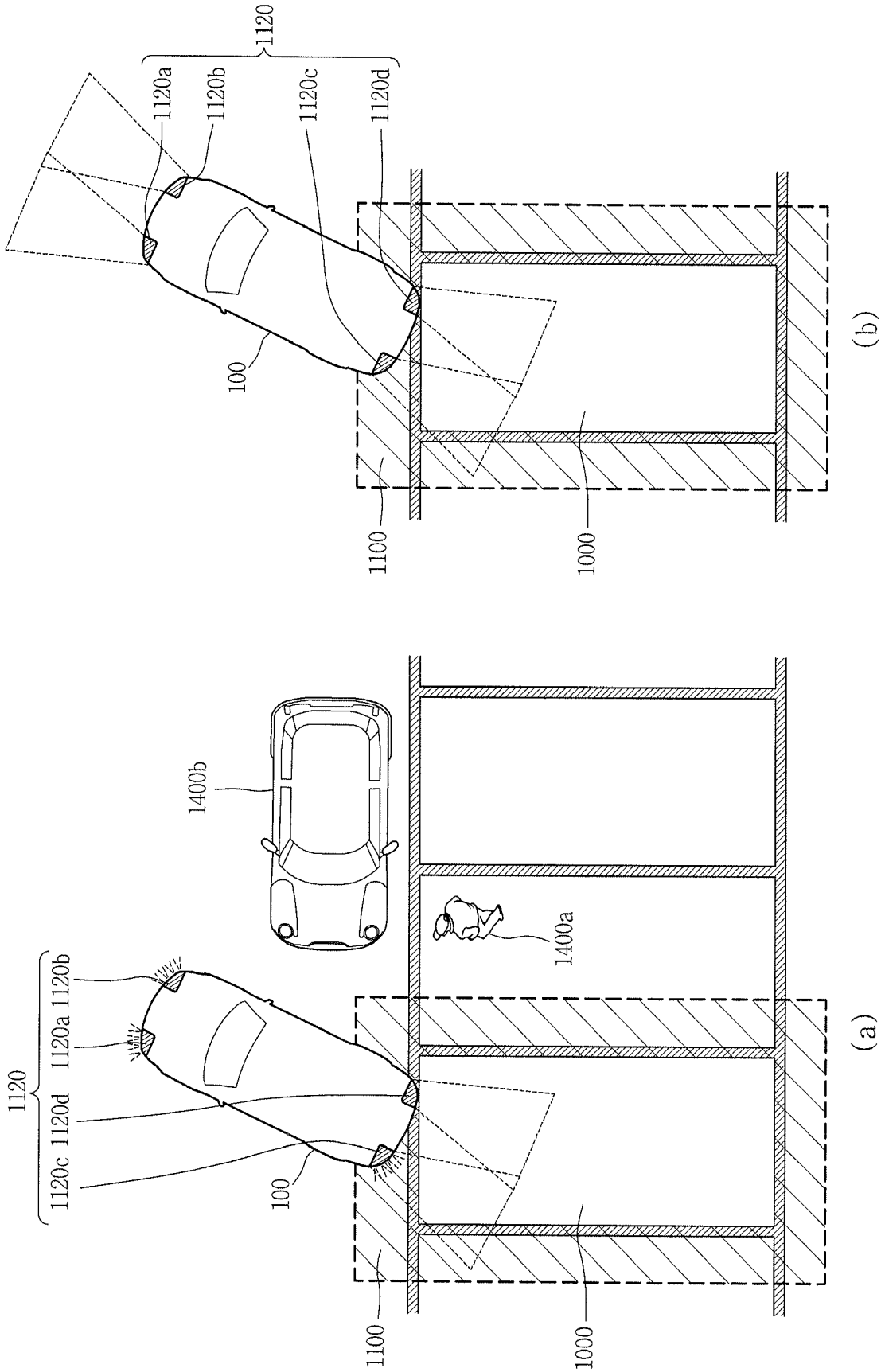
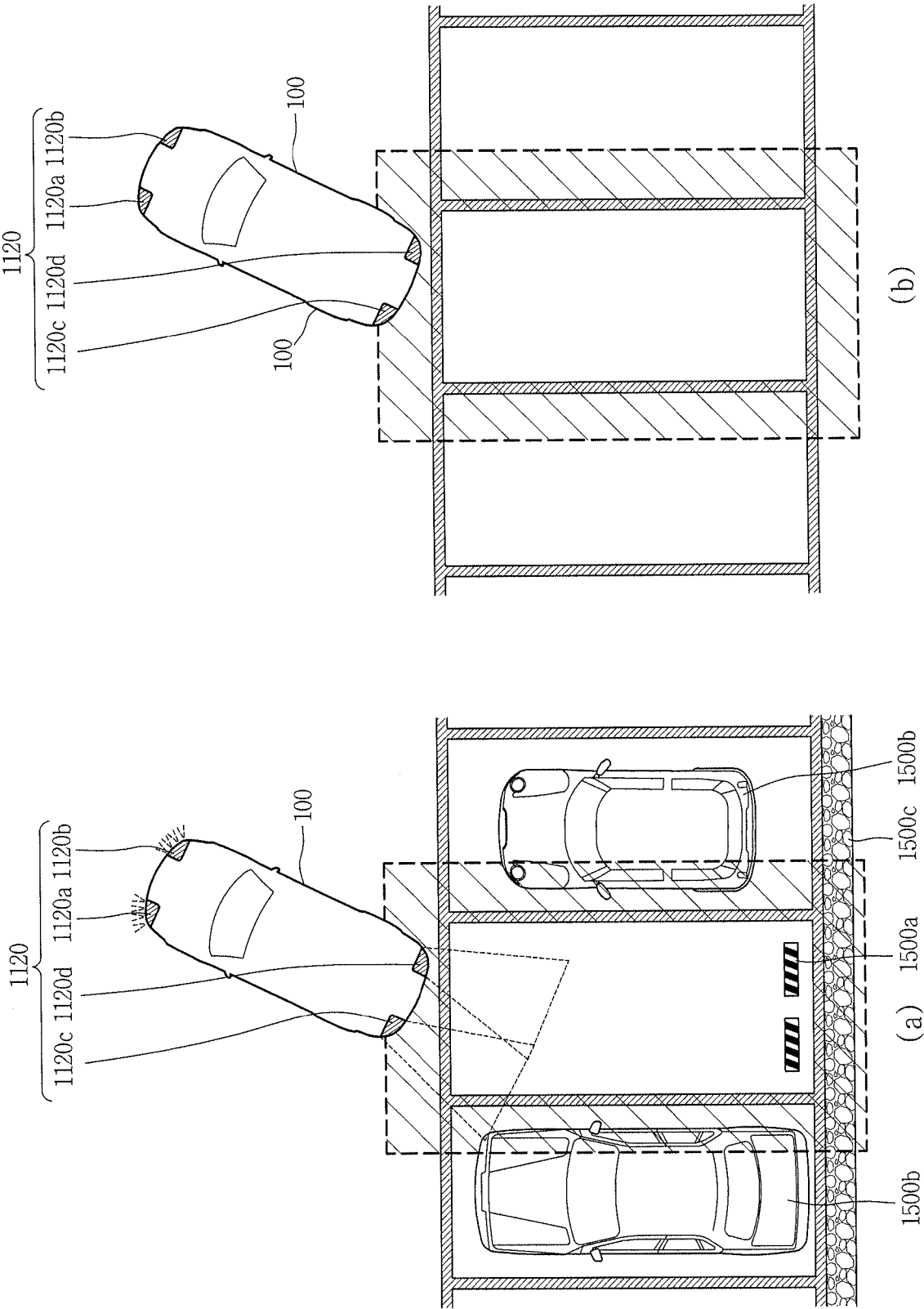


FIG. 15





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